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SUMMARY OF RECENT ABSTRACTS*

VII. HELMINTHIASIS†

TREMATODES

Schistosomes: General

At the conference on helminthic diseases held in Nairobi in 1958 (p. 604) various papers were read on schistosomiasis, and included information on clinical subjects and on snail hosts.

The report of the work of the last 10 years by the Antimalarial Division of the Ministry of Health of Israel (p. 102) contains a reference to the control of schistosomiasis. *Biomphalaria alexandrina* is found in one area, and *Schistosoma mansoni* is transmitted there. Breeding of *Bulinus truncatus* has been controlled round Lake Tiberius by lowering the water level and dusting the mud with copper sulphate. SALITERNIK and WITENBERG (p. 383) note that in spite of the great influx of immigrants excreting either *S. haematobium* (26%) or *S. mansoni* (74%) into Israel, only one small epidemic of each infection has been recorded. *B. truncatus* is found in many places, but is not a suitable host for *S. haematobium* from Iraq and Morocco, and there is little contact between man and snail-infested water. They discuss molluscicides, herbicides and the effect of vegetation and the composition of water, on the breeding of snails.

CAPRON and BRYGOO (p. 717) discuss the origin of the acid-alcohol-resistant substance found in the eggs of various helminths.

VOGEL (p. 610) points out that acquired resistance can be observed in experimental schistosomiasis, and that animals exposed to numerous weak infections closely following each other acquire strong resistance to superinfection. Unisexual infection can produce complete resistance to bisexual infection, which suggests that the deposition of eggs is not essential in the production of immunity.

RIDLEY (p. 47) remarks that he has found the complement-fixation test positive

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1960, v. 57. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on helminthiasis in this series, see the August and September issues of the *Tropical Diseases Bulletin* each year since 1939.

in 82% or more of subjects with *S. mansoni* or *S. haematobium* infection of less than 10 years' duration. False positive reactions do not occur with good antigens, but these may be difficult to obtain; the active principle, being water-soluble, may be washed out of cercariae by repeated washing, or may be removed during extraction with alcohol. Antigens from naturally infected snail livers and cercariae contaminated with snail faeces proved the most satisfactory.

Habib and Habib (p. 609) report on serum sodium and potassium levels in *S. haematobium* and *S. mansoni* infections in Egypt. Ibrahim and Girgis (p. 722) describe cor pulmonale in schistosomiasis.

As a result of examining biopsy specimens of the liver in young Nigerian soldiers Carter and Shaldon (p. 381) conclude that schistosome involvement of that organ takes 2 forms. One is granuloma formation due to the eggs, and the other is hepatitis going on to diffuse fibrosis. Abdalla and Queiroz (p. 385) discuss splenoportography in various conditions, including schistosomiasis.

Bueding (p. 48) gives an account of the mode of action of antimonials and other drugs used in schistosomiasis.

Hubendick (p. 610) comments on the fact that some strains of snails are refractory to strains of schistosomes and others are not; he suggests that the introduction of resistant strains of snails (which are likely to survive better than susceptible strains because infection involves reduction of life span and reproduction) into habitats of susceptible snails may be useful in control of the disease.

Foster *et al.* (p. 1079) write favourably on trials of a new molluscicide (Bayer 73; 2-hydroxy-5, 2-dichloro-4 nitro-benzanilide) against East African snails—*Biomphalaria pfeifferi nairobiensis* and *Bulinus tropicus*. It does not, apparently, readily decompose in field conditions, and may be effective in doses not lethal to fish—though in comment Waddy notes that fish fry are much more susceptible to DDT [and possibly to other substances] than grown fish.

Schistosoma haematobium, etc.

In reporting a small focus of *S. haematobium* infection in Uganda Rosanelli (p. 820) maintains that in practice the chemical examination of urine for blood is the simplest and most practical method for detecting the disease in children who require treatment. Excess of epithelial cells in urine in all but pregnant women also indicates the infection. This infection is a potent cause of hepato-splenomegaly in children in an endemic area.

Maffi (p. 46) comments on urinary schistosomiasis in Somalia.

S. haematobium infection is common in the Lower Juba region of Somalia, where *Bulinus* (*Physopsis*) *abyssinicus* is the intermediate host; Baruffa (p. 1078) points out that the snail is not found in the river itself, but is present in large numbers along the edges of the seasonal flood waters. Edible plants grow in the flood waters, fish are caught, and the land is cultivated as the floods recede, and there is therefore ample opportunity for contact of man with water, and for infection.

Ainslie (p. 45) found *S. haematobium* eggs in the urine of about 10% of the men of a Rhodesian battalion before they were sent to Malaya. They were treated, but others were found after a period in Malaya, and must have been carriers for some time; no suitable snail hosts were found there, but it is thought possible that adaptation to local snails could occur. Treatment with

lucanthone was not very successful, and intravenous sodium antimony tartrate proved to be the most effective of several drugs tried.

COWPER and WOODWARD (p. 1077) note that *S. haematobium* infection was found in 8 of 100 persons working on a plantation near Ibadan, Nigeria.

NAJARIAN (p. 916) describes his method of rearing and maintaining *Bulinus truncatus* in the laboratory.

HONEY and GELFAND (p. 1278) have published a monograph on the urological aspects of schistosomiasis as seen in patients in Southern Rhodesia. This cannot well be summarized, but it covers symptomatology, diagnosis and treatment. DEUVE (p. 47) gives an account of the lesions of the upper urinary tract in patients with schistosomiasis in Rabat; renal insufficiency was common and calculi were often found in the bladder. BADR *et al.* (p. 254) discuss obstruction of the neck of the bladder due to schistosomiasis, and the treatment of this condition. Details should be sought in the original. ZAHER *et al.* (p. 488) report their experience of schistosomal urinary fistula, and in the original paper they give details of treatment, including surgical technique. In a long paper which should be read in full, PRATES and GILLMAN (p. 820) discuss carcinoma of the bladder in Portuguese East Africans, in relation to schistosomal cystitis.

FRIEDHEIM *et al.* (pp. 48, 382) think that a single intramuscular injection of 0·3–0·5 gm. TWSb once each month may prevent patients from passing live eggs of *S. haematobium* in urine, and may therefore help to prevent spread of the disease. There would probably be little danger of drug resistance.

Bayer 2249 (" tasteless Miracil ") was developed from lucanthone, but a trial in *S. haematobium* infection showed that it was less effective than lucanthone, quite as toxic, and quite as unpalatable (ROSS, p. 821).

After a trial in African children SCHNEIDER and SANSARRICQ (p. 49) conclude that the compound para-aminophenoxy-1-phthalimido-5-pentane (M & B 2948A) is valuable in the treatment of urinary schistosomiasis.

COLLINS *et al.* (p. 488) describe the action of certain aminophenoxyalkylamides in the treatment of experimental schistosomiasis, and comment on their toxicity; one of them has been found moderately useful against *S. haematobium* in man.

In examinations of African children and other persons in several parts of the Eastern Transvaal where *S. haematobium* is very common and *S. mansoni* rather less so, PITCHFORD (p. 143) found ova indistinguishable from those of cattle, sheep and goat schistosomes, in the urine or faeces of up to 23% (even more in one group) of the people examined. Schistosomiasis of domestic animals is common in the area. All subjects carrying the cattle schistosomes were infected with *S. haematobium* and all but 1 with *S. mansoni*. The cattle schistosome eggs were much longer than *S. haematobium* eggs, but the finding of eggs intermediate in length suggests that hybridization may take place.

Schistosoma mansoni

FALCÃO (p. 917) has published a monograph on Pirajá DA SILVA and the part he played in the discovery and description of *S. mansoni*.

In the West Nile district of Uganda almost one-third of the people are infected with *S. mansoni*; NELSON (p. 608) remarks that the highest incidence is in children aged 5–15 years, and most adults show no objective signs. The mildness of this infection in this area may in part be due to acquired immunity, but is also probably the result of racial tolerance developed over long periods; it may also possibly be due to strains of the parasite whose virulence is low.

Indiscriminate treatment in the absence of proper understanding of such matters may be dangerous. It may destroy immunity, and repeated courses of treatment may seriously damage the liver.

POIRIER and CARRÉ (p. 822) describe a focus of *S. mansoni* infection in Madagascar, and remark on the seriousness of this infection in view of the extension of irrigation systems.

S. mansoni infection was prevalent in the island of St. Kitts, British West Indies, as late as 1932 when the incidence was estimated at 25%. At that time the monkeys of the mountains were also affected. The human disease now seems to have disappeared, and FERGUSON *et al.* (p. 919) consider that this is the result of unplanned environmental improvements.

BRASS (p. 255) reports a survey in Venezuela which showed schistosomiasis in 9·65% of people over 16 years old; no cases were found in the mountain towns.

STANDEN and FULLER (p. 259) submitted *S. mansoni* cercariae to ultra-violet radiation, and found that a very short treatment had a profound effect on their ability to complete their development to the adult stage, but they can, apparently, still penetrate the skin and enter the lymphatics. The possible value of this observation for the protection of water supplies remains to be seen.

HUNTER (p. 919) describes his technique for the recovery of adult *S. mansoni* from mice.

In discussing the diagnosis of *S. mansoni* infection DE JESUS and HERNANDEZ-MORALES (p. 384) conclude that rectal biopsy is better than examination of faeces, but both methods should be used; the presence or absence of eggs cannot be determined by the appearance of the rectal mucosa. SPINGARN *et al.* (p. 489) have found digital examination of the rectum, with microscopic examination of material remaining on the finger stall, useful in detecting eggs of *S. mansoni.*

ROSENBERG and BLACK (p. 381) use a Menghini needle to obtain liver tissue for examination for *S. mansoni* eggs by compression on a slide; this simple technique is more valuable in diagnosis than examination of fixed and sectioned specimens.

PIFANO and RON PEDRIQUE (p. 258) found that the cercarial test of Vogel and Minning tended to become positive from the 4th week of *S. mansoni* infection in man—before the intradermal test and the appearance of eggs in the faeces. The test was positive in 78% of a large number of proved human cases.

CANCIO *et al.* (p. 720) found that the active antibodies responsible for the circumoval precipitin reaction round eggs of *S. mansoni* were present in only the gamma-1-globulin fraction of serum from patients infected with *S. mansoni.*

KLOETZEL (p. 256) finds that this precipitin test with sera from infected persons is mostly quantitative and can indicate active oviposition. The index falls after effective treatment. RODRIGUEZ-MOLINA *et al.* (p. 257) observed that the reaction gradually became negative in mice infected with *S. mansoni* and later treated with stibophen, while remaining positive in untreated controls. This may be true in man and probably indicates that when the test becomes negative the infection is ended.

SLEEMAN (p. 720) describes the preparation of an antigen from adult *S. mansoni,* which can be used with some success in a complement-fixation test, though positive results are also given by sera from persons with other schistosome infections.

ANDERSON (p. 1282) has devised a slide flocculation test for *S. mansoni* infection, in which a cercarial antigen is used.

LEE and LEWERT (p. 720) describe the distribution of various reactants in sera from patients with *S. mansoni* infection, on fractionation by starch electrophoresis; the original abstract gives some details.

SENTERFIT (p. 257) has already shown that miracidia of *S. mansoni* can be immobilized by sera of infected animals; the reaction is due to an antibody. He compares this with other reactions; the antibody was at high level in acute infections, and low in chronic infections. Serum from patients infected with *Trichinella spiralis* contained miracidial antibody, but not serum from persons harbouring certain other helminths. The serum of persons infected with *S. mansoni* contains a substance which inactivates the enzymes of the cercariae; this substance behaves like an alpha globulin but LEWERT *et al.* (p. 258) think that it is probably not an antibody, but a non-specific substance occurring at low level in serum. In man the level is raised as a result of tissue damage.

Egyptian splenomegaly results from several aetiological factors, of which *S. mansoni* infection is only one; MOUSA and EL-GAREM (p. 721) report full studies on the circulation in patients with hepato-splenic involvement. MAGALHÃES *et al.* (p. 490) give an account of the various forms of hepatic fibrosis encountered in the liver at 956 autopsies in Brazil; in 44·15% the fibrosis was due to schistosomiasis. LIMA GOMEZ *et al.* (p. 386) discuss the clinical aspects of hepato-splenic *S. mansoni* infection — enlargement or increased consistency of the liver, oedema and ascites, hypoprothrombinaemia, and hypersplenism which affects the bone marrow. The fundamental lesion is hepatic fibrosis which leaves the liver cells relatively unharmed. DEWITT and WARREN (p. 386) observed the course of hepato-splenic schistosomiasis in mice infected with *S. mansoni*. The liver and spleen became enlarged, and ascites, oesophageal varices and anaemia developed, but liver function tests were hardly affected. There was progressive increase in the beta and gamma globulins, which suggests a disturbance of the reticulo-endothelial system. MENDES (p. 722) gives an account of the diagnosis of hepato-splenic *S. mansoni* infection, but details should be sought in the original abstract.

GARCÍA-PALMIERI *et al.* (p. 146) discuss various shunt and other operations performed on 41 patients with *S. mansoni* infection and portal hypertension.

MAGALHÃES (p. 491) exposed mice, already infected 3 months earlier, a second time to cercariae of *S. mansoni* and observed the effects on the lungs, which were much more marked and inflammatory than in mice at first infection. He believes that retention and destruction of these parasites in the lungs occurs only in re-infected "premunized" animals.

PRATA and MACHADO (p. 918) describe pulmonary changes in a few patients during treatment of *S. mansoni* infection with antimonials. The condition, which was benign, resembled Loeffler's syndrome, and it cleared in 4–16 days.

Experiments on rats and their power of learning suggest to KERSHAW *et al.* (p. 822) that low-grade *S. mansoni* infection retards the learning process; the effect seems to be indirect.

PITCHFORD (p. 917) used triostam in *S. mansoni* infection, but the results were unsatisfactory; it has given good results in *S. haematobium* infection. LUTTERMOSER (p. 50) tried to enhance the action of tartar emetic and stibophen in mice infected with *S. mansoni* by using various substances as adjuvants; he succeeded only with glycerol.

BARBOSA *et al.* (p. 145) describe a technique for artificial insemination of planorbid snails. WEBBE (p. 1078) reports observations on seasonal fluctuations in the population of *Biomphalaria pfeifferi nairobiensis* in a crater lake in Tanganyika; there is a marked fall in density after the long rains. A focus of *Biomphalaria pfeifferi* has been discovered in the Stanleyville area of the Congo, where only *Bulinus* (*Physopsis*) *africanus* was formerly known to exist; LASSANCE (p. 144) comments on the danger of the possible introduction of *S. mansoni* into the area which formerly had only *S. haematobium*, and speculates on the means by which *B. pfeifferi* was introduced, possibly in fodder cut from river banks for cattle driven from Ituri to Stanleyville.

In a study of part of Puerto Rico subject to floods ROWAN (p. 255) observed that the snail density of streams soon recovered in spite of minor floods, probably because egg masses remained attached to marginal vegetation. Artificial flooding, therefore, would not help to control *Australorbis glabratus*.

PARAENSE and DESLANDES (p. 145), after careful comparison of the anatomy of *Taphius* [*Australorbis*] *centimetralis* from Brazil and *Biomphalaria pfeifferi* from Mozambique, conclude that they are identical; they can interbreed freely.

BARBOSA *et al.* (p. 380) succeeded (for the first time) in infecting *Planorbarius metidjensis* from Morocco with miracidia of Brazilian *S. mansoni*. This snail is believed to be the host of *S. haematobium* in Portugal.

BÉNEX and LAMY (p. 609) show that extracts of various snails which are not suitable hosts for a strain of *S. mansoni* immobilized miracidia of that strain, whereas extracts of snails which were good hosts did not show this effect. The reaction is probably antigenic in character.

BARBOSA and BARRETO (p. 1080) observed that a strain of *A. glabratus* from Bahia (Brazil) was very unreceptive of infection by *S. mansoni* from Pernambuco, whereas a strain of the same snail from Pernambuco was very susceptible to the same strain of *S. mansoni*. They speculate on the mechanism of this resistance, after comparing the tissue reactions of the two strains of snails to the miracidia.

COLOMBO BARRETO (p. 256) has confirmed in the laboratory the findings of other workers that snails (*A. glabratus*) from habitats which normally dry out in summer are much more resistant to desiccation than those from habitats which retain water throughout the year. KLOETZEL (p. 719) also reports experiments on the resistance of *A. glabratus* to desiccation; those from a permanent lake were less able to withstand drying than those from land which dries each year. Details should be sought in the original. *A. nigricans* cannot survive as long as *A. glabratus* out of water; BARBOSA and BARBOSA (p. 609) suggest that the faculty of survival in this way is genetically controlled. [See KOMIYA and his colleagues, below.]

PERLOWAGORA-SZUMLEWICZ (p. 384) reports studies on the biology of *A. glabratus*; for details the original should be consulted.

Schistosoma japonicum

The Formosan strain of *S. japonicum* is a non-human strain, but the Formosan monkey is not susceptible to it; HSÜ and HSÜ (p. 920) have also found that the rhesus monkey resists this strain, though susceptible to Chinese, Japanese and Philippine strains.

CHENG *et al.* (p. 51) report 72 cases which they regard as dwarfism associated with *S. japonicum* infection acting selectively on the pituitary.

After analysing records from various laboratories in China WU *et al.* (p. 1080) conclude that the evidence indicates a true causal relationship between schistosomiasis [*S. japonicum*] of the large intestine and carcinoma, and that the schistosomiasis usually antedates the carcinoma by 5 years or more.

T'ANG and CH'EN (p. 51) report a successful 3-day course of treatment of children infected with *S. japonicum* by means of tartar emetic (total dose 13–14 mgm. per kgm.); the children tolerated the drug well. SHEN *et al.* (p. 1081) tested various substances for possible effect in increasing the alimentary absorption of tartar emetic; only BAL-glucoside had this effect, but it also increased the toxicity and decreased the therapeutic effect of tartar emetic given by mouth to rabbits infected with *S. japonicum*.

CHU *et al.* (p. 260) report favourably on an antimonial compound (Sb-5) and its sodium salt in experimental *S. japonicum* infection; they (p. 387) compared 3 drugs, Sb-58, Sb-126, and TWSb, concluding that Sb-126 gave slightly better results than the others, probably because it was more slowly excreted. Sb-58 (sodium antimony dimercaptosuccinate) is a trivalent antimonial recently synthesized in China, and as it had proved more successful and less toxic than potassium antimony tartrate in the treatment of animals infected with *S. japonicum* HSÜ *et al.* (p. 1184) used it intramuscularly in 567 patients with this infection. The results were encouraging and the authors recommend a short course of 3 days for early cases, and one of 12 days for advanced disease. The lowest relapse rate recorded was 22%. Details of dosage are given in the original abstract.

In experiments on antimonial drugs given by mouth to mice infected with *S. japonicum* SHIAO *et al.* (p. 1082) found that 8-hydroxy-quinoline-antimony complex was more effective and less toxic than tartar emetic by mouth.

SHIAO *et al.* (p. 491) found that of all the extracts from pumpkin seeds the oil-free powder, the aqueous and the acetone extracts were the most potent in the treatment of experimental *S. japonicum* infection, and CHOU and HUANGFU (p. 722) also write favourably of powdered pumpkin seeds. The powder is not as effective as antimony but could be used along with it; patients in the late stages who cannot withstand antimony receive benefit from pumpkin-seed powder.

CHING *et al.* (p. 823) report experiments to find an effective regime for the treatment of *S. japonicum* infection in rabbits.

GARCIA (p. 823) records the finding of schistosome eggs in the sputum of a patient with haemoptysis in the Philippine Islands. Experiments with cercariae from *Oncomelania quadrasi* applied to the skin of rats resulted in the finding of schistosomes in the pulmonary arterioles; these were thought to be of a species distinct from *S. japonicum*, and the author suggests the name *S. philippinensis*, but other workers are not convinced that the evidence for this is satisfactory.

REY (p. 49) reports snails of the genus *Oncomelania* in part of Brazil where there are many Japanese immigrants; no *S. japonicum* infection was found but there may be a risk of transmission.

KOMIYA *et al.* (p. 259) report on a technique for studying the food habits of *Oncomelania* and its mouth-opening reaction. IIJIMA (p. 147) gives an account of population studies on *O. nosophora* in its natural habitat.

KOMIYA and IIJIMA (p. 147) observed that *O. nosophora* collected from areas which dried out at certain seasons withstood experimental desiccation better than snails collected from permanently wet areas, which suggests a process of

natural selection in the customary habitats, and KOMIYA and HASHIMOTO (p. 260) report that *O. nosophora* can withstand drying up to about 40 days, but that all young snails were dead at 60 days, and older snails at 80–100 days. The critical water loss appeared to be about 40% of fluid contained in body and shell.

HUANG (p. 1282) discusses the chemistry of cercaricidal agents of *S. japonicum*.

Schistosome dermatitis

ANANTARAMAN (p. 611) reports schistosome dermatitis due to *S. spindale* in India, and HUNTER (pp. 261, 1083) reports schistosome dermatitis for the first time from Colorado; the organism was *Trichobilharzia physellae*.

In studies on the penetration of schistosome cercariae (*Schistosomatium douthitti*) into the skin of rabbits MILLEMANN and MERGENHAGEN (p. 1083) observed that subcutaneous injection of an antihistamine compound would inhibit the action of the cercariae, probably by preventing the cercarial enzymes from releasing histamine from the tissues.

Fasciola: *Clonorchis*: *Paragonimus*, *etc.*

ROWCLIFFE and OLLERENSHAW (p. 1285) discuss the bionomics of the egg of *F. hepatica*.

KENDALL and PARFITT (p. 53) show that species of *Lymnaea* from different countries vary in their susceptibility to infection with *Fasciola gigantica* and *F. hepatica*, though young snails are generally susceptible to all species. Strains of snails also vary in susceptibility to miracidia of their own area. After careful investigation CHOWANIEC and DRÓŻDŻ (p. 148) conclude that *Galba truncatula* is the only intermediate host of *Fasciola hepatica* in Poland.

LAMMLER (p. 920) shows that albino rats can be infected with *F. hepatica*, and can be used satisfactorily for chemotherapeutic tests.

OKABE and OBA (p. 388) found various worms in 52 cats examined in part of Japan, noting particularly the fact that 13·4% carried *Clonorchis sinensis*, and 15·3% *Metagonimus yokogawai*. KOMIYA *et al.* (p. 1283) found *Clonorchis* in 13·3% of 4,021 persons examined from a lake area in Japan; metacercariae were found in 5 species of fish, which are named.

WYKOFF (p. 261) has succeeded in preparing from *Clonorchis sinensis* an antigen for complement fixation; it was used successfully in tests on experimentally infected rabbits. MIKI (p. 725) prepared various antigens from adult *C. sinensis*, for use in precipitin and rapid flocculation tests; the results on infected rabbits were encouraging, and the author thinks that these tests may provide a criterion of cure. WALTON and CHYU (p. 724) used antigens consisting of acid-soluble protein fractions of whole worm preparations of *Clonorchis sinensis* or *Paragonimus westermani* for skin tests in Korea. Limited cross reactions occurred between these two infections, but as a result of widespread skin-test surveys the authors estimate that there are 4½ million persons infected with *C. sinensis*, and 1–1½ million with *P. westermani*, in South Korea. One mode of infection with *P. westermani* may be the common custom of treating measles with the liquor of crushed raw crayfish. DUK JIN YUN (p. 1284) also refers to the practice of treating measles in Korean children by giving them juice expressed from raw crayfish, and gives a description of paragonimiasis which resulted from this custom in a series of children.

Ito *et al.* (p. 148) found *Paragonimus westermani* (5·2%), *Metagonimus* spp. (23·3%) and *Pseudoheterophyes continua major* (1 in 192), all potential parasites of man, in dogs in the Shizuoka Prefecture of Japan; incidence rates are shown in brackets.

Vajrasthira *et al.* (p. 53) found paragonimiasis in 1·3% of 3,000 persons examined in a district of Thailand; the infected people all lived near small streams and made a custom of eating raw shrimps and crabs. Oshima *et al.* (p. 1185) report studies on the excystation of metacercariae of *P. westermani*; details should be sought in the original summaries. Tsuda (p. 492) describes a technique for collecting metacercariae from crabs, and notes that the trunk of the crab is the common site for them; he gives an account of their resistance to heat and various chemicals.

Takano (p. 1283) discusses the relative values of complement-fixation, rapid flocculation and intradermal tests in the diagnosis of paragonimiasis in an area of Japan where the disease is apparently common. The rather complicated results are given in the original abstract.

Tsuzi *et al.* (p. 1185) report 2 cases of paragonimiasis of the brain, in both of which surgical treatment was successful.

Wang and Liu (p. 388) discuss the radiological appearances of the lungs in paragonimiasis. The lesions occur mostly in the middle and lower zones, cloudy at first and hardening to nodular or cystic appearances on progression. The worms may reach the peritoneal cavity or the central nervous system, and the diagnosis in such cases is discussed.

From experiments on animals (dogs and rabbits) Aburaya *et al.* (p. 1186) conclude that for the treatment of *Paragonimus* infection the use of Irgafen (a sulphonamide) with emetine is an advantage over emetine alone, probably because it increases the concentration of emetine in the tissues. Treatment with emetine must be prolonged.

Izyoumova (p. 54) observes that infection of fish with *Opisthorchis felineus* and *Diphyllobothrium latum* has become more common in the Soviet Union, and draws attention to heavy infection in the reservoirs on the great rivers, where conditions are favourable. Infection of man is increasingly possible.

Duggan (p. 1083) has established that the correct name of the snail host of *O. felineus* is *Bithynia leachii* (Sheppard).

CESTODES

Laine *et al.* (p. 149), on the basis of various reports of investigations, and on the sale of anthelmintics, estimate that an average of one-fifth of the population of Finland are infected with *Diphyllobothrium latum*, and they comment on the need for change in the methods of preparing food.

Kaipainen and Ohela (p. 54) think that tapeworms may break up the vitamin-B12-intrinsic-factor complex and thus decrease the absorption of B12 from the intestinal tract, thereby promoting pernicious tapeworm anaemia. Markkanen *et al.* (p. 1187), by a technique with radioactive material, have been able to show that *D. latum* is very avid of vitamin B12. Differences may also be detected in the urinary excretion of pantothenic acid and thiamine between anaemic and non-anaemic carriers of *D. latum*. In experimental work Nyberg (p. 1187) shows that *D. latum* blocks the effect of intrinsic factor, lowering its vitamin-binding capacity.

FAIN and PIRAUX (p. 824) describe a sparganum found in a man in Ruanda-Urundi, and speculate on its species and origin. BROOKS *et al.* (p. 1189) report 2 cases of sparganosis from Mississippi; the species was probably *Diphyllobothrium mansonoides*, though this could not be proved. GLEASON (p. 921) reports a case of sparganosis from Alabama; specific identity could not be determined.

MONTEIRO (p. 1084) gave to adult patients 0·2 gm. mepacrine every 5 minutes (with bicarbonate solution) to a total of 0·8 or 0·9 gm. for the treatment of *Taenia solium* or *T. saginata* infection, with good results.

In the Congo THIENPONT *et al.* (p. 389) observed that of 100 pigs with cysticerci in the muscles, 68 had larvae of *T. solium* in the brain.

ALTMANN and BUBIS (p. 261) report multiple infection of a patient with *T. saginata* (16 found at autopsy), and note that she had relatively little gamma globulin in the serum, which might account for the failure of immunity to restrict the infection to a single worm.

In experiments on calves LUCKER and DOUVRES (p. 726) found that a small proportion of *T. saginata* eggs kept on hay remained viable for 3 weeks but not for 10 weeks. The loss of viability was probably due to desiccation. LUCKER (p. 921) shows that *T. saginata* eggs may withstand freezing at a temperature of 24°F. for periods up to 11 weeks.

JOPLING and WOODRUFF (p. 55) analyse a series of 240 patients with tapeworm infection (238 *Taenia saginata*) who were treated in London with success in 79%. 5 regimens were used, and all were equally successful; they involved male fern or mepacrine or both, and the authors give details of administration and management, which should be read in full. DONCKASTER *et al.* (p. 1188) have discarded the treatment of *T. saginata* infection by duodenal intubation with glycerol, saturated magnesium sulphate solution, and saline, because patients developed the "dumping syndrome"; on the other hand intubation with acridines in isotonic solution has proved very successful.

An account is given by JONATHAN (p. 1189) of hydatid disease in North Wales, where it is not uncommon. MANDRAS *et al.* (p. 922) comment that the incidence of hydatid disease in Sardinia is one of the highest in the world, and report a survey which gives an even gloomier picture of the rural population. NENOW (p. 923) gives figures of the high incidence of this disease in animals and man in Bulgaria. It occurs in Israel, but is not common; most cases are found in 4 named districts (RAKOWER, p. 494). KELLY and IZZI (p. 263) report on 189 cases seen in Baghdad in 3½ years. Stray dogs and sheep maintain the parasite. The authors describe the clinical findings.

BROOKS *et al.* (p. 150) call attention to the importance of hydatid disease in the lower Mississippi valley, and MUJICA (p. 262) reports the second known case in indigenous Venezuelan people. MYERS (p. 1286) gives an account of the disease as seen in children in an Australian hospital. Pulmonary involvement was relatively common.

LUBINSKY (p. 1084) discusses the variability of the number of rostellar hooks in 2 species of *Echinococcus* from North America.

PEREZ DEL CASTILLO (p. 1287) discusses the immunobiology of *Echinococcus* with particular reference to the multiplicity of antigens and the need to identify them more fully. MAGATH (p. 262) discusses the antigens from *Echinococcus* used for the Casoni and complement-fixation tests. KNIERIM (p. 390) found the complement-fixation test positive in only 61% of persons with the disease,

and observed cross reactions in some other helminthic and non-helminthic infections.

FISCHMAN (p. 728) devised a flocculation test for hydatid disease, in which a sensitized latex suspension is the antigen; he found a considerable degree of correlation with the results of the standardized complement-fixation test.

GARABEDIAN *et al.* (p. 1287) describe a simplification of their indirect agglutination test for hydatid disease, and KAGAN *et al.* (p. 1288) show that some patients with diseases other than hydatid disease may give positive reactions to haemagglutination or flocculation tests with hydatid fluid antigens.

ANGELILLO *et al.* (p. 825) used the conglutination reaction for confirmation of the diagnosis of hydatid disease in man and animals. The test confirmed the infection in over 80% of known cases, but there were some positive reactions in controls.

GEMMELL (p. 494) points out that the fox is a definitive host of *Echinococcus multilocularis* but probably not of *E. granulosus*. VOGEL (p. 1190) has found *E. multilocularis* in field voles and foxes in southern Germany; he thinks that in the field the cycle is fox—field-mouse—fox, and in the house it is cat—house-mouse—cat. ARSLANOVA (p. 1190) reports that one-third of the cases of hydatid disease found at autopsy in southern Kazakhstan were of the alveolar type.

KLEEVENS and DE HAAS (p. 612), for the first time, report *Hymenolepis nana* infection in Netherlands New Guinea. HACIG *et al.* (p. 922) report studies on an antigen of *H. diminuta* for skin and serological reactions in infected animals. Cross reactions were found in skin tests of children with other helminthic infections.

In a review of the anthelmintic activity of dithiazanine iodide AGUILAR (p. 142) reports that it is useful in infection with *Hymenolepis nana* but patients with *H. diminuta* or *T. saginata* were not regarded as cured. JIMÉNEZ-QUIRÓS (p. 389) and SHAFEI (p. 612) write favourably of di-phenthane-70 [dichlorophen] in the treatment of *H. nana* infection. A single dose reduced egg counts of *H. nana* by 70% or more in 78·6% of 68 infected persons; it was also successful against *T. saginata* in 4 (BIAGI *et al.*, p. 727).

MAZZOTTI *et al.* (p. 390) used a drug known as Ro 2-5655/3 (whose composition is given) for treatment of *H. nana* infection, and recommend it.

HUTCHISON *et al.* (p. 149) record the 9th known human infection with *Dipylidium caninum* in the United States.

HSIEH *et al.* (p. 150) report success with dithiazanine iodide in the treatment of a child infected with *Raillietina madagascariensis*.

ACANTHOCEPHALA

BECK (p. 149) reports possible infection of man with *Moniliformis moniliformis*; only 3 previous natural infections are known.

Charles Wilcocks

(to be continued)

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

UITTLEY, K. H. **Epidemiology and Mortality of Malaria in Antigua, B.W.I., 1857–1956.** *Amer. J. Pub. Health.* 1961, Apr., v. 51, No. 4, 577–85. [Numerous refs.]

Antigua, an island in the Caribbean lying between Puerto Rico and Barbados, has an area of 108 square miles, with a population of about 55,000. Most of the people are of African descent, and are mainly engaged in the growing of sugar cane and in peasant farming, with fishing as a subsidiary occupation. The material on which this survey is based has been extracted from entries in the registers dating from 1857 onwards.

Malaria appears to have been moderately prevalent in the island until the last 8 years, when it seems to have died out. Data from other territories [which are listed in detail] confirm that malaria mortality in the Caribbean was falling rapidly even before the initiation of the large-scale anti-malaria operations sponsored by WHO in recent years.

In Antigua the main mosquito vector is said to have been *Anopheles aquasalis*, though severe epidemics have occurred in which *A. albimanus* was the only anopheline recorded. *A. argyritarsus* has also been recorded, but has never been found infected.

In a report published 9 years ago, the malaria parasites encountered were *Plasmodium falciparum* and *P. malariae* in the proportion of 2 to 1 [this *Bulletin*, 1953, v. 50, 373], but in a survey conducted 30 years earlier, 11% of the infections recorded were with *P. vivax* [*ibid.*, 1922, v. 19, 572].

Although malaria appears to have died out in Antigua, 3 potential malaria vectors are still present, so that an imported case might give rise to an epidemic should there be any slackening of effort on the part of the local health authorities. *G. Covell*

VARGAS, L. El tamaño de la localidad como factor epidemiológico en malariología. [**The Size of the Area as an Epidemiological Factor in Malariology**] *CNEP Bol.* Mexico. 1960, Oct.–Dec., v. 4, No. 4, 200–212, 7 graphs. [16 refs.] English summary.

BRAY, R. S. **Studies on Malaria in Chimpanzees. VIII. The Experimental Transmission and Pre-Erythrocytic Phase of** *Plasmodium malariae*, **with a Note on the Host-Range of the Parasite.** *Amer. J. Trop. Med. & Hyg.* 1960, July, v. 9, No. 4, 455–65, 12 coloured figs. [18 refs.]

Experiments described in this paper were devoted to a study of *Anopheles gambiae* as a vector of human and chimpanzee strains of *Plasmodium malariae* in Liberia and of the tissue stages of development of this parasite induced by intravenous inoculation of the apes with sporozoites from infected mosquitoes.

It was found that *A. gambiae* was not susceptible to infection with the simian strain of *P. malariae*, but could be infected with the human strain, irrespective of whether man or chimpanzee was the donor.

By inoculation of infected salivary glands of mosquitoes the author succeeded in infecting 6 chimpanzees, the livers of which (on biopsy and autopsy) revealed pre-erythrocytic stages of development of *P. malariae*, from 8 to 12½ days old. The tissue stages, which are situated in the liver parenchyma, are described in great detail and are illustrated in a series of excellent colour figures. They differ from the tissue stages of *P. falciparum* and *P. vivax* in that *p. malariae* causes enlargement of the host-cell nucleus and there is considerable vacuolation of the peripheral cytoplasm in the older stages, while the number of merozoites produced by it is fewer and its growth rate is much slower. The tissue stages and their nuclei in *P. malariae* are smaller than those of *P. ovale*. It is also distinct from *P. inui* in the tissue phase.

The author discusses the interrelationship between malaria parasites of man and chimpanzees, based largely on his own findings and summarized in the accompanying table [compiled by the reviewer from the text].

Interrelations between Malaria Parasites of Primates:

Diseases	Malignant Tertian		Benign Tertian		Ovale	Quartan	
Parasites	*P.reichenowi*	*P.falciparum*	*P.vivax* *schwetzi*	*P.vivax* *vivax*	*P.ovale*	*P.malariae* simian	*P.malariae* human
Chimpanzee liver	?	++	?	++	++	?	++
,, blood	++	i.+,s.++	++	i.+,s.++	i.+,s.++	++	++
Human liver	?	++	?	++	++	?	?
,, blood	–	++	+	++	++	++	++
Infection of *A.gambiae*	–	++	+	++	++	–	+

Symbols: + scanty infection ? not known
++ heavy infection i. intact animal
– no infection s. splenectomized

The susceptibility of man to infection with *P. malariae* from chimpanzees raises the question as to whether these apes might be reservoirs of human infection, and the disease a zoonosis. However, this possibility is dismissed on epidemiological grounds. *C. A. Hoare*

YOUNG, M. D. & BURGESS, R. W. **The Infectivity to Mosquitoes of *Plasmodium malariae*.** *Amer. J. Hyg.* 1961, Mar., v. 73, No. 2, 182–92, 1 fig. [19 refs.]

A strain of *Plasmodium malariae* (USPHS strain), isolated in Monroe, Louisiana, in 1932, has been maintained since that date in the National Institute of Allergy and Infectious Diseases Laboratory, Columbia, S. Carolina. During

a period of 14 years commencing in 1942, malaria was induced by means of this strain into 550 patients, upon whom thousands of mosquitoes were allowed to feed. Transmission was usually effected by blood injection, but occasionally by the bites of infected mosquitoes or by intravenous injection of sporozoites. Since its isolation in 1932, the strain has apparently lost none of its infectiousness to mosquitoes.

The comparative susceptibilities of the species of mosquitoes tested, in decreasing order, were: *Anopheles freeborni, A. punctipennis, A. aztecus* and *A. quadrimaculatus.* Of 7,354 *A. quadrimaculatus* dissected, 3·1% were infected. The length of the sporogonous cycle in this species was 19–23 days when incubated at 76°F. Transmission of malaria to 6 patients was accomplished, 3 by the bites of infected mosquitoes and 3 by the intravenous injection of infected glands.

Mosquitoes became infected in nearly every week of the first 6 months of the primary attack, the highest infectivity being recorded during the 10th week. There was wide variation in the infectiousness of different malarious patients to mosquitoes.

An autochthonous chronic asymptomatic case of *P. malariae* of at least 18 months' duration infected mosquitoes.

During the primary attack the asymptomatic parasitaemias infected mosquitoes at about the same rate as the symptomatic. This tends to make case-finding more difficult, an important consideration in areas where eradication campaigns are in progress.

The authors point out that the occasional human host able to infect mosquitoes consistently, together with the long persistence in him of potentially infective parasites, helps to explain the sporadic distribution, low incidence and relative lack of epidemics due to this parasite, as well as its persistence in certain areas. *G. Covell*

Coluzzi, M. Alcuni dati morfologici e biologici sulle forme italiane di *Anopheles claviger* Meigen. [**Morphological and Biological Data on Italian Forms of** *Anopheles claviger*] *Riv. di Malariologia.* 1960, Dec., v. 39, Nos. 4/6, 221–35, 4 text figs. & 5 figs. on 2 pls. [17 refs.] English summary.

In recent years, the careful examination of several species of mosquitoes has revealed heterogeneity, due to the existence of races or subspecies. Examples are the " complexes " of *maculipennis, pipiens* or *pulchritarsis.* There is evidence that *Anopheles claviger,* too, exists in more than one form. The following varieties have been described:

missirolii Del Vecchio, 1939
petragnanii Del Vecchio, 1939
petragnanii race *saheliensis* Senevet & Andarelli, 1955
pollutus Torres Canamares, 1945
amaurus Martini, 1929.

The author has examined various stages of a large number of specimens, mainly from Italian territory, and has reached the conclusion that *missirolii* and *petragnanii* are distinct races (though he does not commit himself to their

exact systematic status). He considers *pollutus* and *amaurus* to be merely forms of *missirolii*; and *saheliensis* is not sufficiently distinct to be separated from *petragnanii*.

From morphological comparisons, he gives characters separating the eggs, larvae, pupae and adults of *missirolii* and *petragnanii*. The characters separating the larvae (mainly chaetotaxy) overlap to a very small extent. Separation of the adults is based on coloration and is rather more difficult.

Studies of the distribution of the two forms suggest that biological differences exist. Breeding sites at about 10°C. (in summer) favour *missirolii*; in those which sometimes reach 20°C., *petragnanii* is most common, while sites at 14°C. may contain both forms equally.

Captures of adults in houses, in the open, feeding on man or animals, suggest that *petragnanii* is more endophilic (though slightly preferring animal blood); whereas *missirolii* is exophilic, but often taken on man.

J. R. Busvine

CARRESCIA, P. M. Malaria da trasfusione: possibilità di profilassi. [**Malaria from Blood Transfusion and the Possibility of Prevention**] *Riv. di Malariologia*. 1960, Dec., v. 39, Nos. 4/6, 209–20. [13 refs.] English summary.

The author has inoculated 18 of his patients suffering from general paralysis with *Plasmodium vivax* and 5 others with *P. malariae* by the intravenous injection of 10 cc. of blood which had been taken from heavily infected donors and then stored for a period to observe how long the parasites survived. The infectivity seemed to last about 5 days in the case of *P. vivax* while *P. malariae* was transmitted after 11 days' storage.

Donors were given 1 gm. of chloroquine and bled 24 hours later. Their blood was inoculated into 9 patients and *P. vivax* was transmitted to 4, *P. malariae* and *P. falciparum* to 2 other patients respectively, while no infection was passed on to 3.

Following a similar technique, the author inoculated 141 mice with *P. berghei* and found that this parasite survived up to 10 days at least when the blood which contained it was stored as is done with transfusion blood banks.

He has treated rats carrying *P. berghei* with chloroquine, bled them 1–6 days later and succeeded in transmitting the *Plasmodium* to other rats with blood which had been stored for up to 6 days.

There is obviously a risk of transmitting malaria through blood transfusion in countries where malaria has been eradicated and this applies more particularly to the quartan type of the disease. Infection with *P. malariae* has been found in persons as long as 30–40 years after their last exposure to the risk: the other 3 species of the parasite which can affect man die out in the body after a much shorter period. In Sardinia, 21 of the 44 patients notified as cases of quartan malaria in the last 8 years are said to have been infected through transfusion of blood for some other condition. Where there is a risk of so transmitting malaria, those receiving a blood transfusion can be given prophylactic chloroquine or, better still, the newer drug pyrimethamine.

J. Cauchi

Peña Chavarria, A. & Vazquez Vigo, M. Paludismo inducido. [**Induced Malaria**] *Bol. Oficina Sanitaria Panamericana.* 1961, Feb., v. 50, No. 2, 131–4. English summary.

As a result of control measures, mortality from malaria in Costa Rica fell from 1,223 deaths in 1942 to 159 in 1952, and 24 in 1958: admissions for malaria to the San Juan de Dios Hospital in San José for the same years were 3,222, 283 and 104. In such a situation malaria is not always thought of, even in the diagnosis of febrile conditions, especially among those from non-malarious areas. Nevertheless cases do occur, some of them "induced", *e.g.* congenitally, by transfusion or by contamination of instruments.

The authors give brief details of 6 cases of induced malaria seen in hospitals in San José. All the patients were admitted for conditions other than malaria and had had blood transfusions, which were followed at varying periods by malarial parasitaemia: 5 were due to *Plasmodium vivax* and 1 to *P. falciparum*. The ages of the patients were 1 month, 20 months, 5 years, 27, 28 and 53 years.

The authors discuss the difficulties of detecting such cases, the investigation and control of donors, the conditions necessary for accepting them and the prevention and treatment of the infection: these follow the usual lines [see also this *Bulletin*, 1961, v. 58, 561]. *H. J. O'D. Burke-Gaffney*

Neghme, A. Transmisión accidental de la malaria por transfusión sanguínea. [**Accidental Transmission of Malaria by Blood Transfusion**] *Bol. Chileno de Parasit.* 1961, Apr.–June, v. 16, No. 2, 44–8. [23 refs.]

Miyagaki, S. [**Experimental Studies on the Distribution in Tissues of Atebrin and Resochin**] *J. Osaka City Med. Center.* 1960, Dec., v. 9, No. 12, Suppl. 5, 4587–602, 3 figs. [32 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

"Distribution in tissues and urinary excretion of Atebrin and Resochin were studied with rabbits and rats revealing the following results;

"(1) Distribution of Resochin in plasma and skin showed a higher value than Atebrin; this value was kept longer than that of Atebrin.

"(2) Distribution of Atebrin in the liver and kidney, on the other hand, was higher than Resochin.

"(3) The urinary excretion rate of Resochin was higher than that of Atebrin.

"(4) Irradiation of ultraviolet ray and/or dark condition have certain influences on the distribution in tissues of these drugs in rats; especially, irradiation of ultraviolet ray markedly increases the concentration of Atebrin in the skin."

Monteny, V. A. R. Comparaison de l'efficacité comme médicaments prophylactiques antimalariens de la chloroquine et de la pyriméthamine. [**Comparative Efficacy of Chloroquine and Pyrimethamine as Prophylactics against Malaria**] *Ann. Soc. Belge de Méd. Trop.* 1960, June 30, v. 40, No. 3, 511–16.

This worker had endeavoured to test the efficacy of chloroquine and pyrimethamine on a Congolese population in 2 villages at an altitude of 1,200 m., and with an average malarial infection of 8%. The 3 species of *Plasmodium* present, *falciparum, malariae* and *vivax*, all proved sensitive to these drugs and the parasites disappeared from the circulation (tested by smears and thick drops) after the administration of half a tablet of pyrimethamine to children and one 25 mgm. tablet to adults, or one 100 mgm. tablet of chloroquine to small children, 2 to older ones, and 3 to adults; the drugs were given weekly.

In those given pyrimethamine, all of 1,504 blood films examined were negative. In those given initially 2 tablets of chloroquine for adults, and one for children, 12 of 692 bloods were positive, but when the fuller schedule described above was used, only 2 of 436 were positive, and both of these had had interrupted dosages.

The disadvantage of chloroquine in mass prophylaxis is its bitter taste. Pyrimethamine, on the contrary, is tasteless. *Philip Manson-Bahr*

MEUWISSEN, J. H. E. T. **Resistance of *Plasmodium falciparum* to Pyrimethamine and Proguanil in Netherlands New Guinea.** *Amer. J. Trop. Med. & Hyg.* 1961, Mar., v. 10, No. 2, 135–9, 2 figs.

A pilot project, in which pyrimethaminized salt was distributed among the population, was begun in 1959 in certain areas in Netherlands New Guinea, with support from WHO and UNICEF. The region is sparsely populated, villages are small and widely scattered and the only means of transportation is by walking. For these and other reasons, the spraying of dwellings with insecticides as an anti-malaria measure is considered impracticable. Malaria is said to be holoendemic [this *Bulletin*, 1960, v. 57, 96].

Salt containing 70 mgm.% of pyrimethamine was distributed every 2 weeks by local village teachers. Adults received a daily ration of 5 gm. of salt and persons under the age of 18 years were given half this quantity. This procedure was designed to provide about 25 mgm. of pyrimethamine per adult person per week.

Three months after the test was begun, *Plasmodium falciparum* displayed signs of resistance to pyrimethamine, despite the fact that the population had never previously received the drug. The strain was resistant to a dose of 225 mgm. of pyrimethamine administered within one week. It also proved resistant to proguanil in an adult dosage of 4·8 gm. administered within 12 days.

It is now proposed to add a 4-aminoquinoline to the salt, which is thought likely to offer less risk of the development of resistance. *G. Covell*

GALLUS, M. I. Lotta antimalarica in Sardegna. **[Anti-malaria Campaign in Sardinia]** *Riv. di Malariologia.* 1960, Dec., v. 39, Nos. 4/6, 245–56, 1 coloured folding map & 24 figs. on 13 pls.

During the period 1946–50, The Rockefeller Foundation and the Italian Government jointly undertook the control of malaria [this *Bulletin*, 1954, v. 51, 1019], surveying for both larvae and the adult insect and spraying against both forms of the vector, and checking the effectiveness of these measures by means

of epidemiological investigations. The State has been responsible throughout for diagnostic, curative and prophylactic action and, from 1951 on, it has appointed a new Regional Unit to continue the work of insect control. Much benefit has been derived from these activities but eradication of the parasite has not yet been achieved: no primary cases were notified in the years 1952–58 but some have again been reported in the last 2 years. At present, any relaxation of effort might well allow the *Plasmodium*, and more especially quartan malaria, in Sardinia to spread again.

Economic needs, as well as the malaria hazard, require that works of reclamation and other " bonification " should be energetically pursued in this island.

The activities and findings are set out in several tables, a map and numerous photographs. *J. Cauchi*

KILADJIAN, Y. **Malaria Eradication. From the Viewpoint of a Practicing Physician working in Cooperation with the Government.** *World Med. J.* New York. 1961, Mar., v. 8, No. 2, 103–5.

A malaria eradication campaign has been in progress in the Syrian region of the United Arab Republic for the last 4 years. The total population is about 4½ million of whom one million live in malarious areas. The basic activity of the campaign consists of yearly spraying of dwellings with DDT, each cycle being completed immediately before the beginning of the transmission season.

The country is at present in the consolidation phase of the programme in the provinces where control measures preceded the eradication campaign, and in the attack phase in others. Active surveillance has been practised in 2 provinces since 1959, covering a population of 345,000 and is planned to cover over one million persons in the current year.

Malaria transmission has been substantially reduced, but there remain a few residual foci in circumscribed areas where its persistence has been favoured by the presence of non-immune nomads living in temporary shelters and moving constantly in search of water and pasturage, and of labour forces shifting into and away from infected areas for agricultural and other occupational purposes.

One of the greatest problems encountered is the presence of asymptomatic parasite carriers. To deal with this repeated visits are paid to any locality where a positive fever case has been detected and blood samples examined from all contacts in the same household and in the immediate neighbourhood. If the person found positive was detected in a non-malarious area and was proved to have been infected outside it, a similar procedure is attempted at the site of origin of the infection and not at the place of detection.

The author believes that under an intensive system of passive surveillance, including in it all the medical and paramedical personnel of the country and the maximum numbers of voluntary workers, there is a good prospect of achieving total eradication of malaria.

A number of figures relating to blood examinations are given.

G. Covell

GÓMEZ MENDOZA, I. Situación actual del paludismo en la República Mexicana. [**Current Malaria Situation in Mexico**] *CNEP Bol.* Mexico. 1960, Oct.–Dec., v. 4, No. 4, 177–85, 1 graph & 1 map.

This report by the Director of Epidemiology of the Mexican National Commission for the eradication of malaria extends the many previous records [this *Bulletin*, 1961, v. 58, 13] and brings the account up to October 1960, in the last year of complete coverage. In anticipation of the stage of epidemiological surveillance, the search for new cases and other appropriate investigations were intensified in August. This was accomplished by a substantial increase in field staff. Special studies were made in certain zones where transmission still occurred: apart from this, the routine was to take blood films from every person with fever in areas having a population of 500 or more persons, and in as many as possible in areas with smaller populations.

The effect of these measures is set out in tables, figures and maps. For example, it is shown that as a result of a staff increase of 77·6% after August, the number of blood films obtained had increased by 99·6% by October. Blood was obtained from 85·1% of people in the malarious area and the percentage of positive films by October was 0·29%. It is noted particularly that the number of infections by *Plasmodium falciparum* fell from 428 in 1959 to 155 in the first 10 months of 1960, and in 4 zones where it had been present in the previous year this parasite was not found in 1960. Of 1,601 cases specially studied, the infection had been acquired in 873 during 1959.

The epidemiological study revealed that in those areas where transmission persisted, the causes included lack of cooperation by some inhabitants, occasional new cases, omission of spraying, population movements, the habit of sleeping outside sprayed zones and the use by temporary inhabitants of makeshift dwellings.

The areas in which no cases of malaria were found in 1960 amounted to 68·7% of the total localities and related to 56·9% of the inhabitants of the previously malarial area. In every zone radical treatment with primaquine was intensified as required. In certain zones the cycle of spraying was modified so that maximum protection coincided with maximum transmission. Every effort was made to spray temporary dwellings in areas where movement of population was a problem.

The author expresses the hope that the problem will gradually be solved so that by 1961 transmission malaria will have been so interrupted that almost the whole of the malarious area in Mexico will have been cleared.

[This is an admirable achievement, which reflects great credit on the organization.] *H. J. O'D. Burke-Gaffney*

See also p. 884, BRAY, **Studies on Malaria in Chimpanzees. VIII. The Experimental Transmission and Pre-Erythrocytic Phase of *Plasmodium malariae*, with a Note on the Host-Range of the Parasite.**

BOWMAN, I. B. R., GRANT, P. T., KERMACK, W. O. & OGSTON, D. **The Metabolism of *Plasmodium berghei*, the Malaria Parasite of Rodents. 2. An Effect of Mepacrine on the Metabolism of Glucose by the Parasite separated from its Host Cell.** *Biochem. J.* 1961, Mar., v. 78, No. 3, 472–8. [33 refs.]

PRINGLE, G. **Two New Malaria Parasites from East African Vertebrates.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1960, Sept., v. 54, No. 5, 411–14, 1 text fig. & 20 coloured figs. on 2 pls.

This paper gives a description, well illustrated by 2 coloured plates as well as by black and white figures, of 2 malaria parasites from East African vertebrates caught in the Usambara Mountains of Tanganyika. One of these, *Plasmodium anomaluri* sp.n., from a scaley-tail or flying squirrel, *Anomalurus fraseri orientalis*, was represented by ring-form trophozoites, schizonts, including segmenters giving rise to 8 merozoites, and gametocytes. The parasite produced no enlargement or stippling of the erythrocytes. It is compared with *P. berghei*, *P. vinckei* and *P. atheruri* [this *Bulletin*, 1959, v. 56, 697], from all of which the new species differs in a number of features. The second parasite, *Haemamoeba acuminata* sp.n., was found in 2 chameleons, *Chamaeleo fischeri tavetanus*, the blood of which contained trophozoites, schizonts and gametocytes. A footnote adds that scanty gametocytes of *H. acuminata* have since been found in a third chameleon. *C. A. Hoare*

BLACKWATER FEVER

See also p. 944, GILLES & TAYLOR, **The Existence of the Glucose-6-Phosphate Dehydrogenase Deficiency Trait in Nigeria and its Clinical Implications.**

See also p. 248, GILLES & IKEME, **Haemoglobinuria among Adult Nigerians due to Glucose-6-Phosphate Dehydrogenase Deficiency with Drug Sensitivity.**

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed:*—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

WALKER, P. J. **Organization of Function in Trypanosome Flagella.** [Correspondence.] *Nature.* 1961, Mar. 25, v. 189, 1017–18, 1 fig.

When trypanosomes are exposed to weak solutions of acriflavine they become photosensitive, and when they are exposed to bright light (430–465 mμ) they are immobilized and killed.

In order to investigate the different parts of the trypanosome, suitable optical arrangements were made to focus a small spot of light, 4 μ across, in the field

of the microscope. Trypanosomes (*T. gambiense* and *T. rhodesiense*) were exposed *in vitro* to acriflavine $10^{-5\cdot1}$ or $10^{-4\cdot81}$M and the spot of light was then moved to fall on a localized part of the trypanosome. Continued exposure of any part of the flagellum produced a gradual slowing of that part and movement usually ceased after 40 seconds, but the other parts continued to move. The posterior part of the trypanosome containing the kinetoplast was relatively insensitive, but exposure for 120–180 seconds caused immobilization [? and death] of the whole trypanosome. It is considered that the flagellum contains both conducting and contractile elements.

[For further details, the original paper should be consulted.] *F. Hawking*

Janssens, P. G., Van Bogaert, L., Michiels, A. & Van de Steen, R. Trypanosomiase africaine, affection virale, Mel B et encéphalite. [**African Trypanosomiasis, Virus Infection, Mel B and Encephalitis**] *Ann. Soc. Belge de Méd. Trop.* 1960, Oct. 31, v. 40, No. 5, 759–69.

A patient was bitten by a tsetse fly on the left arm in February 1958, with the development of a local lesion. Trypanosomes were recovered from his blood some 10 days later, and he was treated with 8 injections of pentamidine. In early June, 4 months after the bite, he suffered severe occipital headache; this was exaggerated on forward flexion of the head, and relieved by vomiting. Though the cerebrospinal fluid was normal further trypanocidal treatment, in the form of Arsobal, was given but the headache, nausea and vomiting became worse. As malaria was suspected the patient was then given nivaquine, but a convulsive muscular seizure with cyanosis and loss of the reflexes suddenly occurred. Tetany was suspected and intravenous calcium was given together with sedation in the form of luminal. Muscular hypertonia persisted, and there were involuntary movements of the hands, and further clonic crises recurred.

About mid-June treatment with BAL was started as there were further neurological changes and Cheyne-Stokes breathing which were thought possibly to be attributable to an arsenical encephalitis. Epileptiform seizures, muscular atonia with loss of reflexes, deep sleep from which the patient could not be roused, and attacks of bilious vomiting together with other manifestations led to his being sent to Léopoldville. There magnesium sulphate and hypertonic serum were given intravenously, more BAL was given intramuscularly, and some steroid treatment was given. The patient's physical condition improved but his somnolence gave way to a disorientated noisy psychotic state with insomnia. Towards the end of June his mental state and his physical condition had markedly improved and he was invalided to Antwerp; there his rapid progress continued and after a week he was well enough to go home. Subsequently, after 10 months, he was considered fit to return to service in Africa, completely recovered.

There are very full records of the results of the many investigations undertaken on this patient both in Africa and after his return to Europe. The authors consider that there is no doubt that he had trypanosomiasis and that this was controlled early by adequate treatment. He then suffered an infection with Coxsackie B virus, the symptoms of which naturally, but incorrectly, were thought to be due to a relapse of his trypanosomiasis. The Arsobal treatment given as a result caused a diffuse acute encephalitis, a condition already shown to be

prone to develop in patients with trypanosomiasis under treatment with Arsobal during concurrent acute virus infections [this *Bulletin*, 1958, v. 55, 1207; 1959, v. 56, 279]. The condition in fact is not an arsenical encephalopathy due to the Mel B treatment, but it is a condition precipitated by treatment with Mel B when given to a patient suffering from an acute virus infection; the liability to its occurrence indicates the danger of Mel B treatment of trypanosomiasis in members of a community suffering from an epidemic virus infection, or of an individual patient suffering from an acute attack of such an infection.

A. R. D. Adams

ADRIAENSSENS, K. **Furaltadone in Human Rhodesian Sleeping Sickness. Report of the First Three Cases.** *Ann. Soc. Belge de Méd. Trop.* 1960, Oct. 31, v. 40, No. 5, 715–23. [20 refs.]

Nitrofurazone has been shown by several workers to be a trypanocide in experimental animal and in human trypanosomiasis [this *Bulletin*, 1956, v. 53, 31; 1958, v. 55, 135, 136]. Furaltadone (N-(5 nitro-2-furfurylidene)-3-amino-5-(N′-morpholinyl-methyl)-2-oxazolidone), another nitrofuran with antibacterial activity, has been used by the author in the treatment of 3 previously untreated African males in Ruanda-Urundi suffering from Rhodesian trypanosomiasis. These patients (aged between 31 and 48 years) were in the second stage of the disease, with raised protein and cell content of the cerebrospinal fluid [CSF], in which also were trypanosomes, and with parasite-positive blood and lymph glands.

The drug was given orally to 2 patients as tablets every 6 hours; the third patient was treated intravenously with 500 mgm. of the drug before similar treatment by mouth began. The drug was given together with milk to reduce gastro-intestinal disturbance, nausea and vomiting; alcohol intake was forbidden. The first patient was given a course of 250 mgm. of the drug every 6 hours for 10 days and then 750 mgm. every 6 hours for 4 days; a gross dosage of 22 gm. (444 mgm./kgm. of body weight). The second had 312·5 mgm. every 6 hours for 4 days, then 812·5 mgm. every 6 hours for 19 days and finally 750 mgm. every 6 hours for another 7 days; a gross dosage of 87·75 gm. (1,755 mgm./kgm.). The last patient started with 500 mgm. of the drug in 15 ml. of 5% glucose intravenously; this was followed by 750 mgm. every 6 hours for 6 days and 500 mgm. every 6 hours for another 21 days; a gross dosage of 60·5 gm. (1,141 mgm./kgm.).

In all 3 patients the blood and glands became parasite-negative within a few days; trypanosomes could no longer be found in the CSF a couple of weeks after the start of treatment; and the protein and cell contents of the fluids were markedly reduced within 3 weeks. Blood sedimentation rates also fell significantly after treatment. By a week after the start of treatment all 3 patients had been very materially relieved of their symptoms (deep pains, headache, anorexia and apathy).

The side effects of Furaltadone treatment included vomiting when the drug was taken without food; one patient had diplopia. The weakness, hypotension, very marked loss of weight and polyneuritis associated with nitrofurazone treatment were notably absent. An inherited deficiency of glucose-6-phosphate dehydrogenase in conjunction with Furaltadone treatment can result in development of a haemolytic anaemia like that associated with favism, primaquine,

nitrofurazone and other drugs. This deficiency had been found in 20% of a sample of the Bantu inhabitants of Léopoldville [*ibid.*, 1960, v. 57, 631]; the 3 patients mentioned in this paper were free from it. Therefore, before treatment with Furaltadone an investigation of the possible presence of the deficiency in a patient would be desirable.

The effect of Furaltadone treatment on the first patient was only temporary; he suffered a parasitic relapse 12 days after its completion and then responded to treatment with suramin and Mel B. The second patient maintained his improvement over 85 days' observation. In the third patient abnormalities suggesting reactivation began to reappear in the CSF, though clinically and parasitologically he did not show evidence of relapse over the 70 days' observation; by the end of this period the cell count of the fluid had fallen again. This temporary resurgence of abnormality in the CSF does occur after treatment with Mel B or Mel W.

This work indicates that much more extensive studies on the Furaltadone treatment of both forms of African trypanosomiasis of man should be undertaken. *A. R. D. Adams*

MÜHLPFORDT, H. Mischinfektionen mit markierten Trypanosomenarten. [**Mixed Infections with labelled Trypanosome Species**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1960, v. 11, No. 3, 265–87, 32 charts. [18 refs.]

In the past various views have been expressed regarding the behaviour of different species of trypanosomes in mixed infections. According to some authors, one species may suppress the other (antagonism); according to others, related species may hybridize, and so forth. The fate of the individual species in a mixed infection is especially difficult to determine when the trypanosomes in question are morphologically indistinguishable, as in the *Trypanosoma brucei* group.

In the present paper the author describes experiments designed to throw light on this problem. For this purpose mixed infections were produced in rats and mice with morphologically identical species of the *T. brucei* group, *viz.*, *T. gambiense*, *T. brucei*, *T. equiperdum* and *T. evansi*. In order to distinguish the components of a mixture, one of the strains was " labelled " by artificial elimination of the kinetoplasts with the help of trypaflavin [this *Bulletin*, 1960, v. 57, 15], while the other strain remained normal. In the experiments a normal strain was mixed with an akinetoplastic strain, the species in question being used in various combinations.

It was found that, with one exception, in all mixed infections the normal strain suppressed the akinetoplastic strain, with the result that eventually only the trypanosomes with kinetoplasts survived. The exception was *T. evansi*: when normal strains of this species were mixed with akinetoplastic strains of its own and other species in mice, only strains lacking this organoid survived. The predominance of one strain over another in these experiments is attributed to differences in their rates of multiplication. There was no evidence of any mutual influence between the components of a mixture, both the normal and aberrant trypanosomes " breeding true ".

[See also this *Bulletin*, 1960, v. 57, 1147.] *C. A. Hoare*

DESOWITZ, R. S. **Studies on Immunity and Host-Parasite Relationships. II. The Immune Response of Antelope to Trypanosomal Challenge.** *Ann. Trop. Med. & Parasit.* 1960, Oct., v. 54, No. 3, 281–92, 5 figs.

The author describes experiments devoted to a study of the course of trypanosome infections and the immune response in antelopes. For this purpose, the animals were challenged with trypanosomes, the course of parasitaemia was followed by daily examination of blood films, the serum-protein patterns were analysed by electrophoresis, and the antibody titres were measured by the author's respiratory method [this *Bulletin*, 1960, v. 57, 689].

One gazelle (*Gazella rufifrons*) and 2 sheep were challenged by blood inoculation of *Trypanosoma brucei*. The antelope and one of the sheep died on the 89th and 15th day respectively, while the second sheep survived the infection. A reedbuck (*Redunca redunca*), duiker (*Sylvicapra grimmia*) and another gazelle were challenged with tsetse flies infected with *T. vivax* The reedbuck failed to become infected; in the duiker trypanosomes were observed for 29 days, while in the gazelle there was a chronic infection, with high parasitaemia up to the 50th day, after which the number of trypanosomes declined until only a few could be detected at long intervals. Finally, another duiker proved to be refractory to infection with *T. rhodesiense*.

It was thus shown that different species of antelopes varied in their susceptibility to trypanosome infection, but alterations in the serum proteins following challenge showed a consistent pattern, *viz.*, there was an increase in beta 2 and gamma globulins. Moreover, it was found that trypanolytic antibody, varying in titre with the species of trypanosome and host, developed in antelopes after challenge. *C. A. Hoare*

MAZZETTI, M. & MELE, G. Comportamento sierico del calcio, fosforo, sodio e potassio nella tripanosomiasi sperimentale della cavia da *T. brucei* **[Calcium, Phosphorus, Sodium and Potassium Levels in the Sera of Guineapigs Infected Experimentally with** *Trypanosoma brucei***]** *Arch. Ital. Sci. Med. Trop. e Parassit.* 1961, Feb., v. 42, No. 2, 65–72. [13 refs.]

WILLIAMSON, J. & STEPHEN, L. E. **Suramin Complexes. VII. Further Attempts to Overcome the Ethidium Complex Injection-Site Reaction.** *Ann. Trop. Med. & Parasit.* 1961, Apr., v. 55, No. 1, 97–106, 1 fig. [17 refs.]

JADIN, J., CHANTRAINE, J., PIERREUX, G. & VAN BRAECKEL, G. Étude d'une souche congolaise de *Trypanosoma lewisi*. **[Study of a Congolese Strain of** *Trypanosoma lewisi***]** *Ann. Soc. Belge de Méd. Trop.* 1960, Dec. 31 v. 40, No. 6, 907–14.

LINCICOME, D. R. & FRANCIS, E. H. **Quantitative Studies on Heterologous Sera inducing Development of** *Trypanosoma lewisi* **in Mice.** *Exper. Parasit.* New York. 1961, Feb., v. 11, No. 1, 68–76. [11 refs.]

WOODY, N. C. & WOODY, Hannah B. **American Trypanosomiasis. I. Clinical and Epidemiologic Background of Chagas' Disease in the United States.** *J. Pediatrics.* St. Louis. 1961, Apr., v. 58, No. 4, 568–80, 6 figs. & 4 maps. [24 refs.]

[See this *Bulletin*, 1956, v. 53, 421.]

GAJARDO-TOBAR, R. Anotaciones sobre un insecto de importancia medica. [**Notes on an Insect of Medical Importance**] *Hosp. Viña del Mar.* 1960, Oct., v. 16, No. 4, 131–41, 9 figs. [11 refs.]

The author gives a detailed account, illustrated with 9 photographs, of the distribution, morphology and biology of a remarkable triatomid variously known as *Triatoma spinolai*, *T. chilena*, *Mepraia spinolai* and *Triatomaptera porteri*. It has medical significance because it has been found naturally infected with *Trypanosoma cruzi* (in some areas up to 100%) and is of entomological importance in that the females have no wings. It also differs from other triatomids in that it can feed on and attack its victims in broad daylight. It is a voracious blood sucker which can feed on any animal.

This bug occurs in Chile from the mountains (up to 3,000 metres) to the sea. It is essentially sylvan, with a preference for sheltered spots. This bug seems to be the only triatomid species beside *T. infestans* found in Chile. In some areas, both species occur together. In one part of the Río Blanco area, the author found specimens which harboured large numbers of trypanosomes which were about twice the size of the usual *T. cruzi* and in different forms, notably crithidias. In the valleys of the Río Blanco and Río Colorado, many specimens of the triatomid were heavily parasitized externally with a trombiculid larva and others contained schizogregarines in the intestine.

H. J. O'D. Burke-Gaffney

ATIAS, A., RUBIO, Mafalda, LOLIC, Milena & VALENZUELA, R. Un nuevo caso de enfermedad de Chagas congénita. [**A New Case of Congenital Chagas's Disease**] *Bol. Chileno de Parasit.* 1961, Apr.–June, v. 16, No. 2, 42–4, 2 figs. English summary (5 lines).

[See this *Bulletin*, 1961, v. 58, (676).]

MAEKELT, G. A. Die Komplementbindungsreaktion der Chagaskrankheit. [**Complement-Fixation Test in Chagas's Disease**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1960, v. 11, No. 2, 152–86. [Numerous refs.]

A detailed description is given of a complement-fixation test (CFT) based on the 50% haemolysis technique devised by WADSWORTH, MALTANER and MALTANER, and adapted for the diagnosis of Chagas's disease by DE FREITAS [see this *Bulletin*, 1949, v. 46, 1129; 1952, v. 49, 606]. The antigen was prepared by washing cultures of *Trypanosoma cruzi*, cryolization, lyophilization, extraction with benzene, emulsification in water or saline and centrifugation, after which the supernatant fluid was used as a stock solution of antigen.

This test is widely used in Venezuela and other parts of South America for the diagnosis of Chagas's disease. Chronic infections revealed by xenodiagnosis were confirmed by this test in 90% of cases. It is especially valuable in cases of chronic myocarditis: a high degree of correlation was established between such cases and positive CFT. Moreover, they also provided a means for the differential diagnosis of other forms of myocarditis. The CFT is also used prophylactically for the detection of the possible contamination of blood banks with *T. cruzi*. The specificity of the test was demonstrated in a control group of persons infected with other micro-organisms, such as *T. rangeli*, *Leishmania braziliensis* and *Mycobacterium leprae*, whose sera produced no cross reactions.

C. A. Hoare

TOBIE, Eleanor J. **Experimental Transmission and Biological Comparison of Strains of** *Trypanosoma rangeli*. *Exper. Parasit.* New York. 1961, Feb., v. 11, No. 1, 1–9, 4 figs. [14 refs.]

"The infectivity of strains of *Trypanosoma rangeli* is compared under experimental conditions. The various strains react differently in the white rat, a vertebrate host, as well as in *Rhodnius prolixus*, an invertebrate host. The survival of *T. rangeli* in the bloodstream of the rat and infections in the intestine, hemolymph, and salivary glands of *R. prolixus* are discussed. Evidence suggests that *R. prolixus* may not be the natural invertebrate host for all strains of *T. rangeli* or that trypanosomes designated as *T. rangeli* actually represent more than one species. Passage through the insect host enhanced the ability of one strain to invade the salivary glands following inoculation into the hemocoele. Maintenance of the strain was thus possible by cyclical transmission."

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

TARTAGLIA, P. Experimentelle Empfänglichkeit des Siebenschläfers (*Glis glis* L.) für Kala Azar. [**Susceptibility of Dormouse** (*Glis glis*) **to Experimental Infection with Kala Azar**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1960, v. 11, No. 2, 187–9, 1 fig.

The author succeeded in infecting dormice (*Glis glis*), captured in Yugoslavia, with a Mediterranean strain of *Leishmania donovani* by subcutaneous and intraperitoneal inoculation of spleen material obtained by biopsy from a child suffering from kala azar and of cultures of the parasite. The parasites could be revealed in the organs of infected animals, which died with symptoms of cachexia within 2–5 months.

C. A. Hoare

Sen Gupta, P. C. & Chatterji, A. **Observations on Drug Resistant Kala-Azar.** *J. Indian Med. Ass.* 1961, Mar. 16, v. 36, No. 6, 225–30, 1 fig. [26 refs.]

While kala azar, particularly the Indian variety, usually responds well to antimony preparations, a small proportion of patients prove resistant. These will usually respond to stilbamidine. However, a few prove refractory even to repeated courses of both types of drug. Splenectomy has been suggested as a definitive treatment of kala azar, but is much less effective than chemotherapy. There does, however, appear to be a place for it in the treatment of the more resistant patients.

The authors have collected 5 patients of this type. They had suffered from the disease for from 4–5 years. All had had repeated courses of antimonials and of diamidines, with temporary improvement followed by relapse, and shorter and shorter remissions. They had grossly enlarged spleens, 5–9 inches below the costal margin, were anaemic, haemoglobin 4·3–11·2 gm., and also showed leucopenia. They were wasted, suffered from complications such as diarrhoea, bronchitis, and nephrosis, and showed vitamin deficiencies.

One patient with ascites and nephrosis died. The other 4 were given post-operative chemotherapy and now responded well. Their haemoglobin and white cells rose to normal levels, there was a pronounced weight gain, and in fact they appeared to be cured. Follow-up for varying periods from 7 months to 7 years confirmed the permanence of the cure in contrast to previous relapses.

Including these 5 patients the authors have collected a total of 25 cases of resistant and splenectomized patients from the literature, of whom 20 were cured by the splenectomy and further chemotherapy. They feel that the operation should not be delayed too long, when once it becomes obvious that chemotherapy alone cannot control the disease, as irreversible damage may have occurred. They stress that the splenectomy should be followed by courses of chemotherapy.

They suggest that the reasons for drug resistance, and for the unfavourable response to chemotherapy can be grouped under three headings:

(a) Relative resistance of the strain of parasite to the chemotherapeutic agents.

(b) Inability of the host's reticulo-endothelial system to use the drugs. This may be due to failure to convert the pentavalent antimonial to the more effective but more toxic trivalent form. It may also be due to difficulty in penetration of the drug into the granuloma-like collections of plasma cells around the parasitized histiocytes in chronic cases.

(c) Hypersplenism, with associated anaemia, leucopenia, and general depression of vital activities. *A. C. E. Cole*

Forattini, O. P. Sôbre os reservatórios naturais da leishmaniose tegumentar americana. [**On the Natural Reservoirs of American Cutaneous Leishmaniasis**] *Rev. Inst. Med. Trop. São Paulo.* 1960, July–Aug., v. 2, No. 4, 195–203, 4 figs. & 1 chart. [21 refs.] English summary.

After reviewing the available data on animal reservoirs of American cutaneous leishmaniasis, which are listed in a table, the author describes the results of a survey carried out in the Province of São Paulo of Brazil. Out of 928 animals examined by blood culture (NNN) and in stained smears of skin lesions (if

present), the following rodents proved to be infected: *Kannabateomys amblyonyx*, *Cuniculus paca* and *Dasyprocta azarae*. Their parasites appeared to be host-restricted, for attempts to infect other mammals with cultures failed.

In discussing his own and previous findings, the author suggests that *Leishmania braziliensis* is not a well-defined species but a complex of races or subspecies which are in the process of speciation. In their primitive sylvan habitat the strains are adapted to local wild animals as hosts. However, when man or his domestic animals come in contact with wild animals they are liable to be infected. In other areas with a denser human population the chances of adaptation of wild strains to man and his domestic animals are greater. Under these conditions dogs may take over the role of reservoir hosts. As the disease in man evolved it produced a number of nosological variants, and it can be assumed that the higher the degree of adaptation between man and the leishmanial parasites the less severe the lesions produced by them. *C. A. Hoare*

De Alencar, J. E., Pessoa, E. de P. & Fontenele, Z. F. Infecção natural de *Rattus rattus alexandrinus* por *Leishmania* (provàvelmente *L. braziliensis*) em zona endêmica de leishmaniose tegumentar do Estado do Ceará, Brasil. [**Natural Infection of** *Rattus rattus alexandrinus* **with** *Leishmania* **(probably** *L. braziliensis***) in an Endemic Area of Cutaneous Leishmaniasis, in Ceará, Brazil**] *Rev. Inst. Med. Trop. São Paulo.* 1960, Nov.–Dec., v. 2, No. 6, 347–8.

The English summary appended to the paper is as follows:—

"Blood cultures of rodents from an endemic area of cutaneous leishmaniasis in the State of Ceará, Brazil, revealed a leishmanial infection in a domestic rat—*Rattus rattus alexandrinus*—a fact which helps to explain the epidemiology of the disease in the region."

Solano A., E. & Vargas V., M. Nuevo tratamiento de leishmaniasis por *Leishmania brasiliensis* con Pirimetamina. Nota previa. [**New Treatment of** *Leishmania braziliensis* **Infection with Pyrimethamine**] *Acta Méd. Costarricense.* 1960, Sept.–Dec., v. 3, No. 3, 265–9.

The authors, from San José, Costa Rica, noticed that a child treated with pyrimethamine for malaria showed marked improvement in leishmanial lesions from which she also suffered. They therefore treated another child, aged 13 years, who had 2 *L. braziliensis* lesions on the leg, with 2 courses of 25 mgm. pyrimethamine daily for 4 days, with 8 days' rest, followed by 12·5 mgm. daily for 4 days. A month after the end of treatment the lesions had reached the stage of cicatrization.

In this preliminary note they describe the treatment of 4 adult patients with multiple leishmanial lesions on the limbs and trunk, confirmed by direct smear and Montenegro tests; in 1 case *L. braziliensis* was confirmed by culture.

The basic dosage was 50 mgm. pyrimethamine daily for 10 days, with 8 days' rest. 2 patients, without any previous treatment, received 2 such courses, followed by 25 mgm. daily for 10 days. In each, there was improvement by the 22nd day and cicatrization before the end of treatment in 1 patient and 22 days after its termination in the other.

A third patient had 50 mgm. daily for 10 days, a rest of 6 days and then 50 mgm. daily for 30 days. There was improvement in 30 days and complete cicatrization at the end of treatment.

The fourth patient had been treated previously with Repodral and tartar emetic without success. He was given one course of the basic treatment followed by primaquine 15 mgm. daily for 10 days [the reason for this is not given]. Clinical improvement began in 22 days and cicatrization was complete 30 days after the end of treatment.

No side effects were seen, even in the third patient who had received such a high dose. Apart from a moderate eosinophilia, no signs of intolerance were found.

The authors relate the action of the drug to its action against tissue forms of plasmodia and suggest that if leishmaniae are undergoing nuclear division when the cutaneous and muco-cutaneous lesions are present, they might be sterilized effectively and development of new lesions prevented.

H. J. O'D. Burke-Gaffney

Gutiérrez Ballesteros, E. Tratamiento de la leishmaniasis tegumentaria por medio del calor de vapor de agua. Estudio de cinco casos humanos. [**Treatment of Cutaneous Leishmaniasis with Vapour-Heat. Study of 5 Human Cases**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1959, Dec., v. 19, No. 4, 317–28, 5 pls.

The author reports further successes in the treatment of human cutaneous leishmaniasis due to *Leishmania braziliensis* by vapour-heat [this *Bulletin*, 1958, v. 55, 1314]. For this purpose steam is produced from water in an electric vaporizer, or in a vessel with a capacity of 3–4 litres, stoppered with a perforated plug or cork into which a glass tube is inserted. A jet of vapour at a temperature of 40–45°C. is directed onto the lesion and allowed to act for 4–5 hours at a time. The results are assessed by microscopical examination of material from the lesion, and if necessary the treatment is repeated.

The paper is illustrated by numerous photographs showing the lesions in 5 cases of cutaneous leishmaniasis before and after treatment, which resulted in the disappearance of the parasites and in rapid cicatrization of the cured lesions.

C. A. Hoare

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

Comte, H., Martin, L. A. & Ouradou, J. A propos de 42 cas d'artérite dite juvénile. [**42 Cases of So-called Juvenile Arteritis**] *Arch. Inst. Pasteur du Maroc.* 1960, v. 6, No. 1, 85–102.

Since 1957, the authors have observed a marked change in the age incidence of arteritis associated with thrombosis among patients referred to the department

of general surgery at Casablanca. Whereas the incidence of "juvenile" arteritis during the period 1941–57 was around 6–8%, 33 out of 39 patients with arteritis seen during 1958–60 were relatively young persons (all Moroccans), the remaining 6 patients (5 Moroccans and 1 European) having what was classed as senile arteritis. Over the period 1957–60, the average age of 42 patients (39 males and 3 females) whose arteritis was classed as "juvenile" was 34 years.

The possibility that the condition might be of rickettsial origin was considered, and agglutination tests on sera from 31 out of 36 patients (88·5%) gave positive results at significant titres, compared with 2 positives out of 26 sera from patients with non-arterial disease. Of the 31 positive sera from patients with arteritis, 13 contained antibodies for *Rickettsia prowazeki* antigens, 5 for *R. mooseri* and 13 for *R. burneti*, all at levels suggestive of active infection.

The rest of the paper is devoted to a discussion of these findings and their implications with regard to treatment. It is considered that the results point to a rickettsial origin for the majority of cases of "juvenile" thrombo-arteritis seen in Morocco. [This interesting paper deserves to be noted by workers in areas where thrombosing arteritis has been observed among relatively young subjects.] *R. S. F. Hennessey*

URBACH, H. & SCHABINSKI, G. Immunelektrophoretische Untersuchungen an *Rickettsia prowazekii*, *Coxiella burnetii* und *Proteus OX*-Stämmen. [**Immunoelectrophoretic Investigations of** *Rickettsia prowazeki*, *R. burneti* **and** *Proteus OX* **Strains**] *Zent. f. Bakt.* I. Abt. Orig. 1960, v. 180, No. 4, 433–41, 6 figs. [23 refs.]

The authors have carried out an antigenic analysis of *Rickettsia prowazeki*, *R. burneti* and *Proteus OX19* and *OXK* by means of gel diffusion and immunoelectrophoresis. The antigens consisted of rickettsial suspensions prepared from infected yolk sacs and washings of 48-hour cultures of the strains of *Proteus* on meat infusion agar. Immunoelectrophoresis was carried out with rabbit hyperimmune sera in a field of 8 v/cm. for 180 minutes, and the precipitates were observed after 2–6 days. In the gel diffusion tests a relationship was observed between *Proteus OX* antigen and *R. burneti* antiserum. With *Proteus OX19* antiserum no coalescence of precipitates occurred between *R. prowazeki* and *Proteus OX19* or *R. burneti*. A relationship was observed between *Proteus* and *R. prowazeki* in immunoelectrophoresis experiments, and other results are presented and discussed. *D. J. Bauer*

MARTIN, L. A., DAYOT & DELANOË, G. Séro-agglutination de *Rickettsia prowazeki* chez des sujets vaccinés au vaccin tué Durand-Giroud. [**Agglutination of** *Rickettsia prowazeki* **by the Sera of Persons Vaccinated with Killed Durand-Giroud Vaccine**] *Arch. Inst. Pasteur du Maroc.* 1960, v. 6, No. 1, 60–64.

The slide micro-agglutination test was employed in a study of antibody levels for *Rickettsia prowazeki* antigens in sera collected from 41 soldiers at various times after inoculation with killed typhus vaccine. From the results the authors conclude that a titre of 1 in 320 in a vaccinated subject should not be taken as

indicating a recent infection or recrudescence unless the last inoculation of vaccine had been given not less than 3 months previously.

R. S. F. Hennessey

HAZATO, H. & YAMAMOTO, S. **The Effect of Polyvinylpyrrolidone on the Viability of *Rickettsia orientalis in vitro*. I. Storage of the Infective Mouse Tissue Suspension and Intraperitoneal Washings in Refrigerator and in Incubator.** *Japanese J. Exper. Med.* 1960, Dec., v. 30, No. 6, 475–83.

This paper describes experiments which showed that the survival of *Rickettsia orientalis* in various media was prolonged by the addition of polyvinylpyrrolidone (PVP) to the media. Maximal survival (in some instances to more than 5 days) was obtained when the organisms were stored at 2–4°C. in brain heart infusion broth containing 3 or 5% PVP. *R. S. F. Hennessey*

NEAL, T. J. & BARNETT, H. C. **The Life Cycle of the Scrub Typhus Chigger Mite, *Trombiculæ akamushi*.** *Ann. Entom. Soc. of America.* 1961, Mar., v. 54, No. 2, 196–203, 7 figs. [19 refs.]

Observations were made on a Malayan strain of this mite; the following is the authors' summary:—

"Results are presented on observations of the life cycle and biology of the chigger mite, *Trombicula akamushi* (Brumpt) reared under constant environmental conditions in the laboratory. The entire life cycle required 46 to 72 days, and data on the development of the various stages are presented. Observations made on the subsequent development of groups of larvae which had been fed on rodents or on chicks indicated that engorgement on the former led to more rapid development. Of particular interest were observations made on sex determination, which indicated that while some females produced both male and female offspring, most females produced offspring of only one given sex."

WEINER, D., BAKER, E. F. & MASON, H. C. **Q Fever Antibodies in Dairy Cattle and in Humans in Washington State.** *Pub. Health Rep.* Wash. 1961, Mar., v. 76, No. 3, 257–60, 2 figs.

Q fever has been shown to occur among dairy cattle in 35 states of the U.S A. and it is likely that it is found in the others [this *Bulletin*, 1960, v. 57, 802]. Previous studies in Washington State made with the complement-fixation test had produced positive results on 2·75% of 327 sera from cattle and 2·08% of 289 from human beings.

The present authors in 1959 examined milk from large dairy herds supplying the cities of Seattle, Yakima and Spokane in Washington State. 4,172 samples were taken from 26 of the 39 counties and from 3 neighbouring states: these represented 30% of known dairy farms in the area. They also examined sera from blood banks in Yakima and Seattle and also from Portland, Oregon.

3,126 sera were examined of which 2,860 were from Washington residents. In all the tests the capillary agglutination technique was used as this is regarded as a valid screening method [*ibid.*, 1957, v. 54, 416].

844 (20·23%) of tests on herd milk were positive: when a few samples which were identified and those from other states were excluded, the overall percentage of positives was 19·8%. 2 sketch maps show respectively the number of positive herds and human sera in each county and the number of towns with such positive results: the counties with the largest number of positive results were those from which most of the milk samples had been obtained.

95 (3·32%) of the sera from Washington residents were positive and also 19 of 266 from neighbouring states.

Evidently there has been an increase in positive findings since the previous survey, at any rate in cattle; but this is not regarded as an unprecedented increase over a period of 10 years. Only 1 proved case of Q fever was detected in Washington in 1959 so that evidently cases are being missed.

H. J. O'D. Burke-Gaffney

POWELL, O. W. **Liver Involvement in "Q" Fever.** *Australasian Ann. of Med.* 1961, Feb., v. 10, No. 1, 52–8, 5 figs. [16 refs.]

In this paper from the Princess Alexandra Hospital in Brisbane attention is drawn to the high incidence of liver disease in Q fever [this *Bulletin*, 1958, v. 55, 1216]. In 72 consecutive cases jaundice occurred in 3 and enlargement of the liver in 47.

The results of various liver function tests are given and it is noteworthy that serum glutamic oxalacetic transaminase activity did not seem greatly raised even in jaundiced patients [perhaps estimation of serum glutamic pyruvic transaminase would have been more helpful]. The liver function test which demonstrated abnormal values in most cases was the cephalin-cholesterol flocculation. Liver biopsy showed focal inflammation as the basic microscopic pattern.

H. Lehmann

BLANC, G., ASCIONE, L. & BÉSIAT, Paulette. Rickettsiémie expérimentale de *Testudo graeca* avec *R. burneti*. Longue persistance de l'infection chez la tortue, passage et conservation du virus chez la tique *Hyalomma aegyptium*. [**Experimental Rickettsiaemia in** *Testudo graeca*. **Prolonged Persistence of** *Rickettsia burneti* **in the Tortoise and Passage and Maintenance in** *Hyalomma aegyptium*] *Arch. Inst. Pasteur du Maroc.* 1960, v. 6, No. 1, 49–55, 3 figs. [11 refs.]

The tortoise *Testudo graeca* is the preferred host of the tick *Hyalomma aegyptium*, which has occasionally been found on lizards and more rarely on mammalian species. The authors have never succeeded in isolating rickettsiae from *H. aegyptium* taken from *T. graeca* in Morocco. To determine whether this tick could be infected experimentally, nymphs and adult ticks were fed on tortoises which had been inoculated intracardially with *Rickettsia burneti*. Subsequent guineapig inoculations revealed that the ticks had become infected, retaining the infection for life and transmitting it to their progeny. Tortoises

inoculated intracardially with *R. burneti* [doses not stated] showed a persistent rickettsiaemia (up to 80 days) but did not develop antibodies. [See also this *Bulletin*, 1960, v. 57, 581.] *R. S. F. Hennessey*

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

See also p. 867, GAST GALVIS [**A Decade of Activity of the Carlos Finlay Institute, Ministry of Public Health, Colombia**].

MEDVEDEVA, G. I. **Comparative Study of the Immunological Aspects of Live Yellow Fever Vaccines.** *Problems of Virology*. London. 1960, v. 5, No. 4, 476–81, 3 figs. [Translated from Russian.]

17D vaccine was inoculated into rabbits and caused development of neutralizing antibody (indices 100–1000) [this is considered a low titre by the author]. Subsequent vaccination with Dakar virus caused neutralizing indices to rise to 10^6–10^8. [17D vaccine is said to immunize only 60–70% of human beings—most observers would expect at least 95%.] Intracerebral inoculation of 17D vaccine into 7 monkeys caused fever in all and viraemia was detected in 3 on the second to fourth days. 24 persons were vaccinated with 17D and 20 developed neutralizing indices over 100 [the titre of the vaccine as used is not stated]. Maximum antibody titres were found 1 month after vaccination and titres were found to fall after 3–6 months. Dakar vaccination by scarification in monkeys caused no febrile reaction and high antibody responses. In 8 human beings Dakar vaccine caused fever in 3 and neutralizing indices over 100 in all. 17D was given subcutaneously and Dakar by scarification to mice: they were challenged [? strain of virus, ? route of inoculation] and resistance indices of 1,000 and 4,300 obtained respectively [the mortality patterns were not suitable for calculation of 50% end-points and these results were not significantly different although the author claims that greater antigenicity of Dakar was demonstrated]. The neutralizing index of sera from the Dakar mice was 14 times higher than from the 17D mice [significance doubtful]. 2 rhesus monkeys were vaccinated with 17D and 2 with Dakar. 6 weeks later both groups and 2 controls were challenged subcutaneously with 700 LD50 of pathogenic yellow fever virus (Kintampo strain). All the vaccinated monkeys survived and had no febrile response while both controls had fever: 1 died on the sixth day, the other developed paresis but survived. *C. E. Gordon Smith*

See also p. 960, FONTAN & FAURAN [**Eradication of *Aedes aegypti* Resistant to DDT in French Guiana**].

DENGUE AND ALLIED FEVERS

BEASLEY, Annie R., LICHTER, W. & SIGEL, M. M. **Studies on Latent Infections of Tissue Cultures with Dengue Virus. I. Characteristics of the System.** *Arch. f.d. gesamte Virusforschung.* 1961, v. 10, No. 5, 672–83. [17 refs.]

The Trinidad 1751 strain of dengue-2 virus was used. It multiplies but causes no cytopathic effects (CPE) in KB cells. KB cultures were infected with 5·6 log LD50 of mouse brain virus, incubated for 2 hours, then washed and incubated for 48 hours. They were then infected with 3–300 TCD50 of type 1 poliovirus (Mahoney). Cultures infected with dengue virus yielded 1·2–2·8 log less virus than controls and the polio CPE was delayed. These effects were most marked with a 3 TCD50 challenge when CPE did not occur in cultures infected with dengue virus. Interference did not occur if the 2 viruses were inoculated simultaneously and a 48-hour interval was more effective than 24 hours. Interference was prevented if the media contained dengue antibody from the onset. Normal mouse brain enhanced the CPE of poliovirus.

KB cells could be chronically infected with dengue virus for over a year without CPE. The chronic latent infection was not eradicated even if the cultures were grown for 9 months in the presence of dengue antibody. In these chronically infected cultures polio CPE was delayed up to 3 days and the yields were 2–3 log lower. The amount of dengue virus in these cultures was variable but low by mouse titration: 3·3 log LD50 in $6–13 \times 10^4$ cells [but much virus not pathogenic for mice may be present]. In chronically infected cultures the cells appeared to multiply more slowly [but it is not clear whether the differences detected are significant]. Cells from control cultures and those infected with dengue virus were implanted in rat brains and tumour formation was looked for histologically after 11 days. Chronically infected cells are said to give reduced tumour formation [but no significant difference appears to have been demonstrated in the data quoted]. *C. E. Gordon Smith*

RABIES

YOSHINO, K.; KONDO, Akira; KUMA, N.; TANIGUCHI, H.; SUZUKI, M. **Infection of the One-Day Old Fertile Hen's Egg with Rabies Virus. VI. Strain Differences in the Egg Adaptability** [YOSHINO, KONDO, KUMA & TANIGUCHI]. *Arch. f.d. gesamte Virusforschung.* 1961, v. 10 No. 5, 684–97, 5 figs. [11 refs.] **VII. Comparison of Viral Yields obtained by Inoculation of Eggs of Different Ages with Different Strains and Production of Vaccine** [YOSHINO, SUZUKI & KONDO]. *Ibid.*, 698–711, 6 figs. [21 refs.]

VI. Mouse-brain suspensions of 3 street viruses were inoculated into 1-day and 7-day-old chick embryos. 2 failed to grow but the Hiroshima strain grew to high titre in 1-day eggs, killing up to 60% of embryos, and to a lower titre more slowly in 7-day eggs without mortality. Of 3 rabbit-fixed strains, 2 failed to grow in 7-day eggs and grew poorly in 1-day eggs. The Nishigahara strain

however grew well in eggs of both ages but better in 1-day eggs with only a low mortality. Of 3 mouse-fixed strains, all grew well in 1-day eggs and less well in 7-day eggs: the 7-day embryos showed little or no mortality but 1-day embryos died within 2 weeks. 25 passages in rabbit brain did not reduce the egg pathogenicity of a mouse-fixed strain: nor did 30 mouse passages increase the pathogenicity of a rabbit-fixed strain of low egg virulence. Passage in 1-day eggs increased the virus yield of 2 strains and increased their killing power until the 1-day egg LD50 was greater than the mouse LD50 in one, and only 1 log less in the other. Early embryo death tended to reduce total virus yield because of the small size of the embryo.

VII. A mouse-fixed virus of high egg virulence, the 1-day egg adapted Nishigahara and the HEP Flury strain were compared for virus yield in 1-day, 3-day, and 5-day embryos. Titres were higher with the youngest embryos but with strains highly adapted to 1-day eggs the mortality was high. At a stage of moderate adaptation the Nishigahara strain was maintained in mouse brain. This strain gave good yields of virus in 1-day eggs and ultra-violet-inactivated vaccines were prepared. In Habel tests on 5 batches the protection indices against heterologous challenge were 69, 112, 120, 650, 1,260 [only the last being acceptable]. The poorest batch was compared with a U.S. Reference Vaccine in a test according to U.S. Minimum Requirements (Minimum Requirements: Rabies Vaccine, National Institutes of Health, Bethesda, Maryland, U.S.A., 3rd Revision, Feb. 3, 1953) and found to be more than 7 times more potent. [This 7-fold difference is probably not significant and the potency of the reference vaccine at the time of test must be suspect.]

[For earlier studies, see this *Bulletin*, 1959, v. 56, 151.]

C. E. Gordon Smith

Niketenko, A. A. & Kobrinskii, G. D. **Fractionation and Study of the Specific Activity of Anti-Rabies Alpha- and Beta-Globulins.** *Problems of Virology*. London. 1960, v. 5, No. 4, 470–76, 2 figs. [Translated from Russian.]

Hyperimmune antirabies horse serum was fractionated with alcohol and a fraction containing 4% alpha and 6% beta globulins obtained. This was compared with gamma globulin. The fractions were heated, diluted and mixed with dilutions of fixed rabies virus. After 90 minutes' incubation the mixtures were inoculated intracerebrally in mice. In 3 tests neutralizing indices of 12,080–70,980 were obtained with alpha and beta globulin and 12,910–93,970 with gamma globulin.

24 mice were given 6 doses of Fermi vaccine: similar groups of mice were given alpha and beta globulins or gamma globulins: and a 4th group acted as control. 5 days after receiving the globulins and 21 days after the start of vaccination the mice were challenged. Resistance indices of 398,100 with vaccine, 1,318 with gamma globulin and 79 with alpha and beta globulin were obtained.

Similar groups of mice were given globulins, then challenged after various intervals with street virus intramuscularly. When challenged 12 days after globulin, 24% receiving alpha and beta globulin survived and 88% receiving gamma globulin; challenged 6 days after, 60% and 84% survived respectively; challenged 3 days after, 92% and 96% survived. 13% of controls survived.

When given alpha and beta globulin immediately after street virus challenge 44% of mice survived compared with 90% of those receiving gamma globulin.

Street virus was applied to the exposed and traumatized masseters of guinea-pigs. The globulin fractions were then applied as a dry powder 15–60 minutes later. Alpha and beta globulins applied 15 minutes after virus protected all of 5 guineapigs, 3 of 5 after 30 minutes and 2 of 5 after 60 minutes. Gamma globulin after 30 minutes protected 2 of 5 guineapigs and after 60 minutes it was ineffective. All the controls died. The mean incubation periods in those treated with alpha and beta globulins were 30–41 days compared with 22 days in controls, and 25 and 36 days in those treated with gamma globulin [these are the figures given in the texts; they do not correspond with those in the table]. *C. E. Gordon Smith*

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

Dodin, A. & Brygoo, E. R. Étude quantitative de l'utilisation des sucres par *Pasteurella pestis* souche E.V. en suspension non proliférante. III. Le xylose. IV. Le mannose. V. La glucosamine. [**Quantitative Study of Glucide Uptake by *Pasteurella pestis* EV Strain in Non-Proliferating Suspensions. III. Xylose. IV. Mannose. V. Glucosamine**] *Arch. Inst. Pasteur de Madagascar.* 1960, v. 28, 15–16.

The utilization of xylose by *Pasteurella pestis* depended on the particular strain used and also on the conditions under which the strain was cultivated.

Mannose is oxidized by the EV strain in the same way, and with the same intensity, as glucose. The Qo_2 of *P. pestis* in utilizing mannose is 89 microlitres of oxygen; the Qco_2 is 25·3, which for glucose is 24 with a Qo_2 of 88.

Glucosamine possesses the same structure as d-glucose or d-mannose, but with an OH group replaced by an NH_2 group. The oxygen consumption, 88 microlitres in the presence of glucose, is only 59 in the presence of glucosamine and the CO_2 figure drops to 19. The carriage of a NH_2 ion does not allow the organism to continue to be able to attack d-glucose and in fact after 3 hours' incubation at 37°C. there is practically no oxidation of glucosamine by *P. pestis.*

[For earlier part, see this *Bulletin*, 1960, v. 57, 31.] *H. J. Bensted.*

Daod Nathoo, F., Dodin, A. & Brygoo, E. R. Recherches sur les antigènes de *Pasteurella pestis*. II. Étude par précipitation en gélose de deux sérums antipesteux avant et après saturation par des extraits A.R.N. et A.D.N. [**Studies on the Antigens of *Pasteurella pestis*. II. Gel Precipitation of Two Anti-Plague Sera before and after Saturation with RNA and DNA Extracts**] *Arch. Inst. Pasteur de Madagascar.* 1960, v. 28, 11–13.

The results of the agar-gel precipitation tests with an anti-plague immune serum globulin prepared by the Lederle Laboratories in rabbits showed 17 flocculation

lines with extracts of whole organisms; with a purified ribonucleic acid extract lines No. 1, 9, 11, 14 and 15 had gone, leaving 12 bands in all; with the deoxyribonucleic acid extract there were 2 bands which seemed to be related to the dissociated band No. 11 obtained with the suspension of the whole organisms.

In tests with an anti-plague serum prepared in the horse at the Pasteur Institute in Paris the same antigens showed fewer precipitation lines; indeed with the deoxyribonucleic acid extract no lines at all were developed.

Saturation tests indicated that the Lederle rabbit serum contained a much more complex antibody system than the horse serum made by the Pasteur Institute. All the antibody in the latter serum appeared to be neutralized by the ribonucleic extract prepared from the EV strain No. 370, whereas saturation of the Lederle rabbit serum with this extract failed to remove all the antibody.

H. J. Bensted

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Ada, G. L., French, E. L. & Lind, P. E. **Purification and Properties of Neuraminidase from** *Vibrio cholerae*. *J. General Microbiol.* 1961, Mar., v. 24, No. 3, 409–21, 7 figs. & 1 pl. [21 refs.]

Pye, J. & Curtain, C. C. **Electrophoretic, Sedimentation and Diffusion Behaviour of Crystalline Neuraminidase from** *Vibrio cholerae*. *J. General Microbiol.* 1961, Mar., v. 24, No. 3, 423–5, 3 figs. on pl.

Guha, D. K. & Mukerjee, S. **Amino-Acid Composition of Phage-Types of** *Vibrio cholerae*. *Ann. Biochem. & Exper. Med.* Calcutta. 1960, Dec., v. 20, No. 12, 349–52. [16 refs.]

Gangarosa, E. J., Beisel, W. R., Chanyo Benyajati, Sprinz, H. & Prapont Piyaratn. **The Nature of the Gastrointestinal Lesion in Asiatic Cholera and its Relation to Pathogenesis: a Biopsy Study.** *Amer. J. Trop. Med. & Hyg.* 1960, Mar., v. 9, No. 2, 125–35, 9 figs. [24 refs.]

There has been some controversy about the state of the intestinal epithelium during acute cholera. Some authors have held that desquamation occurs as a result of the activity of the *Vibrio* in the lumen. Others have blamed epithelial desquamation or post-mortem autolysis. By means of serial intestinal biopsies, the authors of this very interesting paper have provided incontrovertible evidence that in their patients the epithelium remained intact during infection.

9 patients were studied, 8 during a recent epidemic in Bangkok and one in Calcutta. All were infected with the Ogawa strain of *Vibrio cholerae*. Serial biopsies of the intestinal mucosa were made. For example, in one patient, 5 biopsies were performed between the second day of the illness and the third week after recovery. In the total of 19 biopsies obtained from the patients, specimens were taken from stomach, duodenum, jejunum, upper ileum and colon. Biopsies were taken in 2 patients on the first day of the clinical illness, in 5 on the second day, in 2 on the third day and in 1 on the fourth day. Specimens were also obtained in convalescence on the 6th, 8th and 27th days.

29 control biopsies were taken from asymptomatic persons who were inadvertently found to be infected with *V. cholerae*, and from patients with diarrhoea without bacteriological explanation.

Biopsy was followed by no ill effects. The method of CROSBY and KUGLER was used, modified by the authors for the colonic biopsies.

Specimens were withdrawn and fixed in buffered 10% formalin within 3 minutes. Histological examination was made after staining with haemotoxylin and eosin, periodic acid-Schiff (for basement membrane and mucus), Alcian blue (for acid mucopolysaccharides) and the Bodian technique (for argentophil granules).

The cellular matter in the "rice-water" stools was studied in the centrifuged deposit, which was mixed with human plasma, clotted with calcium, embedded in paraffin and examined histologically when stained with haemotoxylin and eosin.

The authors found in the acute cases an acute diffuse enteritis involving principally the small bowel, but also the stomach and colon. *The epithelium was intact throughout* with "a severe degree of goblet-cell transformation of the young chief cells located within the crypts of Lieberkuhn and a progressive exhaustion atrophy of the older cells lining the villi". There was an inflammatory reaction in the mesenchymal tissues of the lamina propria, with vascular congestion and moderate mononuclear cellular infiltration; there was also some migration of these mononuclear cells into the epithelium; there were no neutrophils. Some reparative processes were evident with mitosis, which the authors interpreted as a compensatory hyperplasia of the epithelial cells in response to precipitous maturation of the epithelium. There were degenerative changes notable especially in the epithelium of the tips of the villi, which was flattened and vacuolated. The authors regard this as evidence of rapid cellular turnover. The basement membrane was degenerative and vacuolated.

In the specimens derived from the control group without cholera, there was some chronic atrophic enteritis with fusion and blunting of the villi, similar to that seen in malabsorption states. This also formed a background in the cholera patients to the acute enteritis described above. It was possibly dietary in origin.

The authors thus demonstrated that in biopsy specimens taken from their cholera patients, the intestinal epithelium was intact throughout the course of the acute disease. That other workers recorded loss of epithelium was probably due to the examination of autolysed necropsy material.

Study of the "rice-water" stools revealed that mucus and not cellular debris was the principal component. This could be explained by excessive mucus production by the goblet cells in the presence of the essentially isotonic fluid of the stool in the lumen. Some epithelial cells were also present, but not in

large numbers; their presence could be explained by the rapid turnover indicated by the increased mitosis and other changes in the epithelium seen in the biopsies.

The authors consider that an intact epithelium of the gut in cholera was to be expected from the physiological behaviour of the intestinal wall. For instance, intravenous injection of Evans blue was not followed by excretion into the stool, suggesting there was no leakage of albumin into the lumen. The failure of inulin to appear in the stool also supported the view that the epithelium was intact.

The absorptive functions of the gut during cholera were tested by administration of ^{131}I; they were intact. Moreover, raised K and HCO_3 levels in the intestinal fluid, compared with simultaneously obtained serum concentrations, indicated active "work" by the epithelium. The authors conclude that the intact epithelium must play an important role in establishing the unique characteristics of the cholera stool.

[The findings of the authors offer important support (i) for the suggestion made recently by other workers during the same epidemics, that the relative electrolyte levels in plasma and faeces during an acute attack can best be interpreted in terms of failure of some intestinal selective resorption mechanism, and (ii) for the current views on the activity of cholera endotoxin, which in both instances demand the existence of an intact mucosal epithelium (WATTEN *et al.*, *J. Clin.Investigation*, 1959, v. 38, 1879; KRUATRACHUE *et al.*, this *Bulletin*, 1961, v. 58, 62).

This paper is one of a splendid series by the American and Thai workers in the Chulalongkorn and Siriraj hospitals, Bangkok, who studied cholera during the two recent epidemics in Thailand. It is to be hoped that the information will soon be collected in more easily accessible form.] *B. G. Maegraith*

FELSENFELD, O. **Antiphage Activity of Human Cholera Sera.** *Proc. Soc. Exper. Biol. & Med.* 1961, Jan., v. 106, No. 1, 175–7.

During the 1958–59 cholera epidemic in Thailand, paired (acute and convalescent) sera were collected from true cases of cholera, from cases of acute shigellosis and salmonellosis, from symptomless carriers of *Vibrio cholerae*, from cholera contacts who showed no signs of the disease, and also from healthy non-contacts. The epidemic was due to *V. cholerae* Ogawa, phage type 1 [MUKERJEE *et al.*, this *Bulletin*, 1958, v. 55, 651]. A locally isolated phage, belonging to Mukerjee's group 1, was propagated on this strain.

All the sera were tested in dilutions from 1 in 10 upwards for purposes of titrating the phage-inhibiting activity of sera. All the acute phase cholera sera, carrier, contact, non-choleraic diarrhoea and healthy control sera showed some antiphage activity; the second specimens of sera, with the exception of the cholera convalescent sera, showed no significant changes in titre, whereas the cholera convalescent sera showed a 3-fold (average) increase over the acute phase sera in antiphage activity. The interval between the first and second specimens varied from 12 to 25 days. *H. J. Bensted*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

MELEIRO, M. G. Estado actual do problema da biologia e poder patogénico das amibas intestinais. [**Current Aspects of the Biology and Pathogenicity of Intestinal Amoebae**] *Gaz. Méd. Portuguesa.* 1960, Nov.–Dec., v. 13, No. 6, 753–79. [38 refs.]

A comprehensive review and discussion.

GOLDMAN, M., CARVER, R. K. & GLEASON, Neva N. **Antigenic Analysis of *Entamoeba histolytica* by means of Fluorescent Antibody. II.** *E. histolytica* and *E. hartmanni*. *Exper. Parasit.* New York. 1960, Dec., v. 10, No. 3, 366–88, 2 figs. [36 refs.]

With the microfluorimeter described by the senior author in 1960 [this *Bulletin*, 1960, v. 57, 810], the intensity of the fluorescence emitted by parasitic amoebae of several strains after treatment with antisera conjugated with fluorescein was measured. The original paper should be consulted for details of the technique: briefly, amoebae were dried from acetate buffer at *p*H 4·5 on to glass slides and then incubated for 1 hour at 37°C. in the presence of the appropriate conjugated antiserum; the slides were then washed and mounted in 90% glycerol at *p*H 7·5 for fluorimetry. Such preparations, sealed with commercial nail varnish, could be stored at −70°C. for several weeks.

The following strains of amoebae were used: three pathogenic strains of *Entamoeba histolytica*; one strain morphologically identified as *E. histolytica* but non-pathogenic to man and only mildly so to guineapigs and rats; two strains of the so-called small race of *E. histolytica* (=*E. hartmanni*); one strain of *E. coli* and one of *E. moshkovskii*. Five antisera were produced in rabbits after the intravenous or subcutaneous inoculation of whole individuals (and in one case frozen and thawed extract) of three strains of *E. histolytica* (one of which was also used to provide amoebae for the test), one heterologous strain of *E. hartmanni*, and the mixed bacterial flora from a culture of *E. histolytica*. These antisera were then conjugated with fluorescein according to standard techniques.

It was found that conjugated normal rabbit serum, used as a control, stained all strains of amoebae to a slight but variable extent. Therefore, results were expressed for analysis as the ratio of the intensity of fluorescence exhibited by amoebae exposed to a conjugated antiserum, compared with that shown by similar amoebae after exposure to conjugated normal serum. This ratio was termed the staining ratio (SR) and, as a result of several experiments designed to determine the reproducibility of the readings, SRs were considered to show a significant difference in the intensity of fluorescence if they were above 1·42 or below 0·70: ratios between 0·80 and 1·25 were considered to reflect no significant difference between the reactions.

Significantly high SRs were obtained when *E. histolytica* of any of the four strains used were exposed to any of the anti-*histolytica* sera but not when they were exposed to the anti-*hartmanni* or anti-bacteria sera (only three strains

were used in these latter experiments). Both strains of *E. hartmanni* gave significantly high SRs when exposed to the anti-*hartmanni* serum and to one of the three anti-*histolytica* sera, but not to the other antisera (only one strain was exposed to the anti-bacteria serum). *E. coli* and *E. moshkovskii* did not react significantly when tested with one of the anti-*histolytica* sera. Doubtfully significant high SRs were obtained when the two *E. hartmanni* strains were treated with one of the anti-*histolytica* sera, and when the non-pathogenic *E. histolytica* was exposed to anti-*hartmanni* serum.

The one anti-*histolytica* serum which significantly stained both *E. histolytica* and *E. hartmanni* gave higher SRs with the former than it did with the latter. The non-pathogenic strain of *E. histolytica* fluoresced less brightly after exposure to anti-*histolytica* sera (in all but one experiment) than did the pathogenic strains. In one experiment, a sub-line of one strain of *E. histolytica* which had been grown in a guineapig's caecum, fluoresced more brightly after treatment with two anti-*histolytica* sera than did two sub-lines of the same strain which had been grown *in vitro*. Fluorescence of a strain of *E. histolytica* after treatment with antiserum produced against the homologous strain was not more intense than that obtained by treating heterologous strains of the same species with the same antiserum. No direct correlation was observed between the size of the dried amoebae and the brightness of their fluorescence, within species.

The authors, while stressing the need for further work and pointing out that all their antisera had relatively low titres, conclude that their results support the view that the " small race " of *E. histolytica* merits separation as a distinct species, *E. hartmanni*: they suggest also that the results obtained with the non-pathogenic strain of *E. histolytica* lend some support to the view that there is a distinct non-pathogenic strain or species of large amoebae morphologically indistinguishable from *E. histolytica*, sometimes referred to as *E. dispar* [see Hoare, this *Bulletin*, 1959, v. 56, 237]. *J. R. Baker*

Maddison, Shirley E. & Elsdon-Dew, R. **Non-Specific Antibodies in Amebiasis.** *Exper. Parasit.* New York. 1961, Feb., v. 11, No. 1, 90–92, 1 fig.

A gel diffusion technique was used to investigate the reactions of various sera with an antigen prepared from *Entamoeba histolytica* grown with *Clostridium welchii* and control antigens prepared from pure growths of *Cl. welchii* and *Escherichia coli.*

One of the precipitation bands which was observed with many of the sera was common to reactions of the sera with both the *E. histolytica-Cl. welchii* antigen and the pure *Cl. welchii* antigen. This band appeared in the serum of all patients with proved liver abscess (14), and in the serum of most patients with dysentery whether of amoebic or bacillary origin. The authors refer to the antigenic factor responsible for this band as the " Welchii factor ".

Similar experiments with the *Escherichia coli* antigen did not reveal the same band.

The authors suggest that the Welchii factor results from absorption of antigenic material from a damaged bowel, and that the non-specificity of immunological tests in amoebiasis may be due to the impurities of the antigen and the absorption of similar impurities from the patient's ulcerated bowel.

W. P. Stamm

BROOKE, M. M. **PVA-Fixative Technique in the Laboratory Confirmation of Amoebiasis.** Reprinted from *Triangle*. 1960, Dec., v. 4, No. 8, 326–35, 2 figs. [33 refs.]

Readers of this *Bulletin* will be familiar with the now well-known PVA-fixative technique for preserving intestinal protozoa which was introduced by GOLDMAN and BROOKE in 1949 [see this *Bulletin*, 1954, v. 51, 117].

Dr. Brooke has now prepared a most useful monograph setting out the *raison d'être* of this technique, its uses and applications. He also describes and illustrates a 2-vial kit for collecting stool specimens; one vial contains PVA fixative for preserving specimens for permanent staining and the other contains 5 to 10% formalin for the formalin-ether concentration technique.

Appendices give in detail the preparation and use of PVA fixative and the staining and examination of films and similar detail for the trichrome staining method [*ibid.*, 1952, v. 49, 146] and the formalin-ether concentration technique.

This detailed practical account does not lend itself to further abstraction: but the practising parasitologist would be well advised to keep a copy by him and to study it with care. *H. J. O'D. Burke-Gaffney*

GHOSH, P. K. & GUPTA, S. **A New Synthetic Compound in the Treatment of Amoebiasis.** *Calcutta Med. J.* 1961, Jan., v. 58, No. 1, 10–12.

Amoebiasis is an important clinical problem in Calcutta. 1,718 stool specimens were examined in an urban hospital in 1958 from patients complaining of dyspepsia and bowel symptoms, some of whom had had previous diarrhoea and dysentery. Cysts of *Entamoeba histolytica* were found in no less than 332 (19·4%) while vegetative forms were only found in 10 specimens (0·6%). In a hospital serving a semi-urban and rural area, however, in 4,211 stool specimens only 127 (3%) contained cysts or vegetative forms.

In their search for an effective treatment the authors tried Entobex (Ciba), 5,6,quinone-4,7 phenanthroline. 63 patients passing cysts or vegetative forms were treated with a regime averaging 1 tablet of 20 mgm. Entobex plus 20 mgm. Enterovioform (iodohydroxyquinoline) 3 times a day for 10 days, with a corresponding dose for children. Stools were examined on 4 or 5 occasions during the 3 to 4 weeks after treatment. Clinical relief was obtained in all 63 patients, and clearance of cysts in all but 3.

In a second series, Entobex alone in 50 mgm. tablets was used in a dosage of 1 to 2 tablets 3 times daily for 10 days. In this series of 22 patients, 13 (59%) showed both clinical cure and freedom from cysts on the 10th and 15th days. In 9 (40%) though there was clinical improvement the cysts were not permanently eliminated. There were no toxic side effects such as nausea or vomiting, though 7 (33%) were constipated. *A. C. E. Cole*

BANERJEE, S. T., BANERJEE, A. R. & CHATTERJEE, S. C. **Observations on the use of a New Anti-Amoebic Drug.** *Calcutta Med. J.* 1961, Jan., v. 58, No. 1, 13–19.

Entobex (Ciba), a semicarbazone of 5,6,quinone-4,7 phenanthroline, was used in the treatment of patients in Calcutta having symptoms of loose stools and

abdominal pain and passing blood and mucus with cysts or vegetative forms of *Entamoeba histolytica.*

8 patients were treated with 1 tablet of preparation 11,925 3 times daily, 11 with 1 tablet of 11,925 4 times daily, and 15 with 1 tablet of 11,925C 4 times daily, all for 7 days. Sigmoidoscopy was done before, and on the 5th and 10th days after treatment, stools examined for 3 consecutive days after completion of treatment, and a follow-up [clinical only?] was made in 75% at 3 months.

The results are given as a tabulation of the individual cases, but from these it would appear that in all cases the stools were cleared of amoebae, clinical symptoms were relieved, and sigmoidoscopic appearances improved. One case of amoebic liver abscess was successfully treated. Side effects were limited to nausea in one patient and anorexia in another.

The follow-up which covered 75% of those treated revealed no relapse symptomatically in any.

[The numerous drugs advocated in the treatment of amoebiasis all appear to give good results in some tests and moderate results in others. This, the variable pathogenicity of the infection, and the variable criteria of cure make the reviewer feel that only carefully controlled trials with random allocation of patients, in which the drug in question is compared with a standard such as EBI, would give any true indication of relative merits.] *A. C. E. Cole*

Abdallah, A., Kordy, M. I. & Saif, M. **Paromomycin in the Treatment of Acute Intestinal Amoebiasis.** *J. Egyptian Med. Ass.* 1960, v. 43, No. 12, 915–22. [12 refs.]

Paromomycin, a new antibiotic, has been found to be active against Gram-positive bacteria and against *Entamoeba histolytica in vitro.* It is little absorbed from the intestinal tract, and this makes it convenient for the treatment of intestinal infections. It is reported to be effective in the treatment of both acute and chronic amoebic infection, though relapses have been noted.

The authors in Cairo used the drug in the treatment of 26 adult male patients suffering from acute amoebic dysentery, and passing the large vegetative forms of *E. histolytica* in their stools. 10 patients were given 250 mgm. 3 times daily for 5 days (an average dosage of 13·8 mgm. per kgm. body weight per day). 8 of these failed to respond, and the other 2 relapsed within 4 days of the cessation of treatment. 10 others were given 250 mgm. 3 times daily for 10 days. Of these 2 failed to respond, and 8, though responding with clear stools, relapsed within 1 month. 6 patients were given 500 mgm. 3 times daily for 7 days (an average dosage of 26·7 mgm. per kgm. body weight per day). All of these responded with negative stools by the end of treatment, but all relapsed within 36 days.

There was no evidence of toxic effects on the liver or kidneys, and the only side effects were nausea and mild anorexia, though the stools remained loose during treatment.

The authors made the interesting observation when examining daily stools that, with the onset of clinical relapse, first the small forms (*E. histolytica minuta*) and later the large forms containing red cells reappeared in the stools. They suggest that paromomycin may act *in vivo* by altering the bacterial flora

of the bowel so as to inhibit the amoebae, but that with cessation of treatment the bacterial flora changes back and the amoebae flourish again.

[Other workers using the larger dosage have reported much better success, see this *Bulletin*, 1961, v. 58, 67 and 200.] *A. C. E. Cole*

González de Cossio, A. **Electrocardiographic Changes under Therapy with Ro 1–9334, a Synthetic Racemic 2-Dehydroemetine.** *Rev. Inst. Med. Trop. São Paulo.* 1960, Nov.–Dec., v. 2, No. 6, 313–18, 6 figs.

"The effects of Ro 1-9334 (2-dehydroemetine) on the electrocardiogram were studied in 14 patients.

"No changes of P, P-R, QRS or AQRS were observed. QT was prolonged in 4 patients. T diminished its voltage in 6 patients and showed an inversion in 2. ST revealed no changes.

"These electrocardiographic changes are considerably less frequent and of shorter duration than those provoked by emetine."

Reitler, R., Berner, A. & Reitler, Emanuela. Über den lytischen Effekt eines Bazillenstammes auf Protozoen und dessen praktische Anwendung. **[On the Lytic Action of a Strain of Bacillus on Protozoa and its practical Application]** [Miscellanea.] *Acta Tropica.* Basle. 1961, v. 18, No. 1, 67–71.

A young Arab man died shortly after admission to hospital in Haifa and was found to have multiple intussusceptions due to masses of *Ascaris*. From the inflamed mesenteric lymph nodes a sporogenous aerobic bacillus was cultivated, an extract of which had a lytic effect on *Paramecium caudatum* and on *Entamoeba histolytica*: it also had some antibacterial action (described as exerted only on Gram-positive cocci and *Pasteurella pestis* but not on Enterobacteriaceae).

This extract, when given by injection to patients with colitis of various kinds had an unexpected "spasmolytic" effect (said to be explained by laboratory demonstration of antagonism to acetylcholine and histamine) but did not affect amoebae in the faeces. On the other hand when given orally to patients with amoebic dysentery it not only relieved symptoms but eventually eliminated amoebae and cysts: 85·5% of 117 cases observed for 8–12 months suffered no relapse.

Hiller, Ltd., Haifa, make the product used in this trial under the name Colisan. [See this *Bulletin*, 1961, v. 58, 801.]

[This strange story is related in so little detail that the authors cannot reasonably complain if judgement on the merits of their work is suspended: but see also *ibid.*, 1960, v. 57, 1171 *bis*.] *L. P. Garrod*

Hirschlerowa, Zofia & Świecicki, A. Dwa szczepy *Entamoeba moshkovskii* (Czałaja, 1941) na Wybrzeżu. **[Two Strains of *Entamoeba moshkovskii* in the Coastal Area]** *Bull. Inst. Marine Med. Gdańsk.* 1960, v. 11, Nos. 3/4, 147–55. [10 refs.] English summary.

The English summary appended to the paper is as follows:—

"In the Polish coastal area two strains were found which were identified as *Entamoeba moshkovskii*. The strain '*Gd*' was discovered in the first tank of the sewage disposal plant in Gdynia. Its trophozoites were at first of small dimensions, their diameter amounted to 11·2 μ on the average. After a complete disappearance of other protozoa and after adaptation within several months, their size enlarged distinctly amounting to 23·5 μ on the average and surpassing in this regard even the original *Čalaja* (*Tshalaya*) form grown in our laboratory. This strain ingests erythrocytes willingly; it has been maintained in culture for 22 months.

"The second strain '*Or*' was found in a stream to which a sewer from a settlement of seamen and fishermen discharges. Its trophozoites are considerably smaller and did not change their dimensions (amounting to 11·4 μ on the average) after 10 months of cultivation. This strain ingests erythrocytes unwillingly. We have seen ingestion in two cases only. Therefore it might be regarded as a transitory form between *Čalaja's* and other authors' strains (also our strain '*Gd*'), and *Neal's* strain which do not ingest erythrocytes completely. Different degrees of this property would be an expression of a gradually diminishing capacity for parasitic life. It must be emphasised that *E. moshkovskii* was only found in the nearest environs and in the city of Gdynia, it has not been discovered in other regions so far.

"Tadpoles were infected with both these strains, but without results. A pathogenicity test was performed with guinea pigs with a negative result."

JARPA, A. & ZULOAGA, Marta. *Isospora hominis*. *Bol. Chileno de Parasit.* 1961, Apr.–June, v. 16, No. 2, 29–30, 1 fig.

The English summary appended to the paper is as follows:—

"The authors report the finding of oocysts of *Isospora hominis* in the stools of 4 individuals. All previous cases of Isosporosis diagnosed in Chile showed oocysts of *Isospora belli*. The significance of this finding is briefly described."

ORŁOWSKA, Bogumila & MORDARSKI, M. Działanie jadów mitotycznych na rozwój pierwotniaków. [**The Effect of Mitotic Poisons on the Growth of Protozoa**] *Archiwum Immunol. i Terapii Dośw.* Warsaw. 1960, v. 8, No. 3, 565–91. [12 refs.] English summary.

The authors have investigated the effect of certain mitotic poisons on the *in vitro* growth of *Trichomonas vaginalis, T. hominis* and *Chilomastix mesnili*. The organisms were inoculated into nutrient medium containing the test compound in concentrations of 10, 100 and 1,000 μgm. per ml.; the extent of growth was noted at intervals up to 96 hours, and subcultures were made after 48 and 72 hours in order to investigate the viability of the organisms.

The results are presented in a series of tables. Colchicine killed all the organisms after 24 hours, but its derivative N-deacetylthiocolchicine was effective only against *T. hominis*. Alkylating agents (mustine, myleran and a benzoquinone derivative) had a marked antiprotozoal effect. Urethane was

inactive, and aminopterin only acted against *T. vaginalis*. The cytostatic antibiotics actinomycin C and sarcomycin were also effective. The results indicate that the effect of mitotic poisons on protozoa *in vitro* may be used as a method of detecting compounds with oncostatic activity. *D. J. Bauer*

YAWS AND OTHER TREPONEMATOSES

GUIMARÃES, F. N. Estado atual da campanha de erradicação da bouba no Brasil. [**The Present State of the Yaws Eradication Campaign in Brazil**] *Bol. Oficina Sanitaria Panamericana.* 1961, Mar., v. 50, No. 3, 241–5.

The author of this paper is the co-ordinator of the campaign and works in the National Department for Endemic Diseases of Rural Areas of Brazil.

In 1956 his department started a national campaign for the eradication of yaws, the aim being first its elimination as a public health problem within 5 years, when the second stage of appraisal and surveillance would commence. The extent of the task can be seen from the fact that this meant the examination of the population of 16 states and 3 territories over an area larger than the Continental United States by a house-to-house investigation and the mass treatment of all patients and contacts. The method of conducting the campaign was by dividing the country up, finally into zones, and mass treatment and re-inspections were carried out by flying columns each consisting of 6 persons; for the most part motor transport was used but in Amazonia launches and even canoes also. The members of these columns were trained in the techniques of sterilization and of intramuscular injection, and were also given an outline of the epidemiology and clinical symptoms and course of yaws.

Treatment was by intramuscular injection of benzathine penicillin G as follows: (a) patients 15 years and older, 1·2 mega units; (b) those under 15 years and (c) contacts, 0·6 mega units. All persons showing cutaneous ulcers and all who stated that they had had the disease were treated as patients. People living in the same house as a person with active lesions were considered to be contacts. Cases of yaws were classified as: recent, hyperkeratosis, late, and latent. Between 1956 and 1959 the figures for mass examination and treatment were: examined, 7,185,227; treated (a) as patients 515,637; (b) as contacts 430,034; percentage positive (including latent cases) 7·1.

3 re-surveys by other specialized teams, including doctors trained as epidemiologists, have since been carried out in 1957, 1958, and (partly) in 1959. 5,491,208 people were re-examined and 101,575 treated as patients and 68,807 as contacts. The number of patients and contacts to be treated in 1960 was estimated at 200,000. The areas of greatest incidence were in the north-eastern states and in Minas Gerais.

The author rightly points out that in addition it is essential also to raise the very low standard of living of persons in the rural areas. He concludes by stating that in 1960 the campaign will have covered the whole country and the stages of appraisal and surveillance reached everywhere. For the latter, voluntary agents will be relied on for the purpose of notifying the disease.

[The bare recital of the actual figures gives at least some idea to inhabitants

of other countries what a tremendous task has been undertaken and how successful it is. It is hoped that another report on the position at the end of 1960 will be available soon.] *W. K. Dunscombe*

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

ELLIOTT, G. B., FREIGANG, B., BROWN, N. L. & WILT, J. **Leprosy in Canada.** *Canadian Med. Ass. J.* 1961, Apr. 8, v. 84, No. 14, 776–80, 8 figs.

GARRETT, A. S. **Report of a Case of Leprosy in a Norfolk Practice.** *Leprosy Review.* 1961, Apr., v. 32, No. 2, 82.

This short note records the case of a patient who had been in Cyprus for 14 months and left in 1957. Three years later the author saw him in his practice in Norfolk. For 2 months the patient had noticed a raised erythematous plaque, 2 × 1 inches, on his chest. Several new small lesions developed in the course of the next few weeks. The plaque was anaesthetic and the supraclavicular nerve leading to it was thickened, as was the left great auricular nerve. The left ear lobe was slightly thickened and smears taken from it and from the lesions showed "mild bacterial positivity in 3 out of 5 smears". The patient was treated with DDS by the mouth (100 mgm. twice a week). For the first 3 weeks new lesions appeared; then Etisul inunction began and marked improvement occurred within a fortnight. Within a month the erythema and elevation of the lesions had disappeared and the nerves were almost normal in size. After 2 months all smears were negative but the anaesthesia persisted. The only sign left at the time of writing is some hypopigmentation of the skin.

The author suggests that this was a case of borderline leprosy with resistance breaking down at the time when the patient presented himself with a "rash". The combined treatment was so rapid in action that the patient was able to return to work in 2 months. The author had seen such rapid improvement in Africa only in a few very early cases. DDS alone would probably have taken 6 months to produce the same result in this patient. It may well be that the outcrops of new lesions might have been prevented had Etisul been given earlier. *H. J. O'D. Burke-Gaffney*

GIRARD, G. A propos des relations entre la lèpre et la tuberculose. Deux documents peu connus. [**Regarding the Relationship between Leprosy and Tuberculosis**] *Rev. Méd. et Hyg. d'Outre-Mer.* 1961, Apr. 15, v. 33, No. 297, 54–62. [12 refs.]

In this article two old documents are reviewed, one written in 1905 and the other in 1888.

The first describes experiments by A. THIROUX in which nodules were taken from the ear lobule of a patient in a leprosarium in Madagascar, and after being ground up in broth were found to contain numerous lepra bacilli. The suspension was injected into 3 rabbits: in one under the nasal mucosa, in another under the dura mater, and in a third into the peritoneum. 2 other rabbits were later infected, one by scarification and the other by injection into the vein of the ear. The first 4 animals developed tuberculosis in 13 to 19 months, the fifth could not be observed long enough. In a later discussion it is postulated that the patient may have had tuberculosis as well as leprosy, or that he may have had some form of tuberculosis resembling leprosy caused by some unusual form of tubercle bacillus.

In the second document by E. CALMETTE (brother of A. Calmette of BCG fame) the happenings in Belle Isle (15 km. off the coast of Brittany) are discussed. There leprosy was introduced from Nova Scotia in 1765 and persisted until the middle of the 19th century. In 1888 tuberculosis had been introduced only some 20 years, but showed a curious patchy distribution, one family being decimated while those only a short distance away were exempt. The question was raised as to whether former infection with leprosy had produced resistance in those who escaped tuberculosis. The whole matter of the relationship of the two diseases is discussed at length. *Ernest Muir*

See also p. 944. GILLES & TAYLOR, **The Existence of the Glucose-6-Phosphate Dehydrogenase Deficiency Trait in Nigeria and its Clinical Implications.**

BROWNE, S. G. **An Acceptability Trial of Etisul Liquid Formula.** *Leprosy Review*. 1961, Apr., v. 32, No. 2, 83–4.

It is well recognized that Etisul has an unpleasant odour which is due to the active principle, ethyl mercaptan [this *Bulletin*, 1960, v. 57, 816; 1961, v. 58, 74]. Attempts were made by Imperial Chemical Industries to mask the odour of their preparation (Ditophal) with the use of perfumes and later they produced a bulk liquid preparation which was found very acceptable by 17 patients who applied it twice a week for 3 months at Uzuakoli Leprosarium, Eastern Nigeria. An improved product, Etisul Formulation F-565, has now been prepared by these manufacturers and the author has tried it on 14 adult patients already under treatment for leprosy with DDS or Ciba 1906. 3 of these patients had had experience of Etisul cream and 3 had also used the earlier liquid preparation as well as the cream.

The dose of 5 ml. could be measured into a container supplied to each patient. All continued treatment spontaneously for the 6-month period, except one who had a recurrent severe lepra reaction. The patients were questioned after (1) the first 4 applications twice weekly, (2) 3 months, and (3) 6 months. Those who had used the cream previously were unanimous that the new liquid formulation was rubbed in with less effort and disappeared more rapidly from the skin and was altogether superior to the cream. The mercaptan odour was less persistent and disappeared more readily after a warm bath with scented soap taken 2 hours after inunction. It would seem that with the cream some of the active principle was adsorbed on the excipient used: with the liquid preparation, a higher proportion of the active principle is probably absorbed by the skin and therefore there should be a greater therapeutic effect.

No difference was noted between the preparations in respect of the mercaptan odour in the breath. After 3 months' treatment all but 2 patients found the smell of the liquid acceptable and at the end of the trial all of the patients "were quite enthusiastically in [its] favour".

H. J. O'D. Burke-Gaffney

MORI, T., KOSAKA, K. & ITO, T. **Detection by Nile Blue staining of Tissue Contaminants in Murine Leprosy Bacilli Preparation.** [Correspondence.] *Biken's J.* Osaka. 1960, Oct., v. 3, No. 3, 261–3, 4 figs. (3 on pl.)

In this letter the authors draw attention to the presence of residual tissue which can be detected in suspensions of murine leprosy bacilli, derived from leproma, by using the Ziehl-Nile blue method of staining but not the Ziehl-Neelsen method. The smears are decolorized with 1% acid alcohol after staining with carbol-fuchsin and then stained with 2 parts saturated aqueous solution of Nile blue and 1 part 95% ethanol for 1 minute.

The authors also describe, in the form of a flow sheet, the method for collecting by differential centrifuging at 900 g, and 12,000 g. the bacilli from homogenized-trypsinized tissue. *S. R. M. Bushby*

HELMINTHIASIS

*In this section abstracts are arranged as far as possible in the following order:—*TREMATODES *(schistosomes, other flukes);* CESTODES *(Diphyllobothrium, Taenia, Echinococcus, other cestodes);* NEMATODES *(hookworms, Ascaris, filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.).*

BÉNEX, J., RAGGAL, M. H. & DESCHIENS, R. Aspects électrophorétiques des protéines du sérum sanguin dans les bilharzioses humaines. [**On the Electrophoretic Properties of the Serum Proteins in Human Schistosomiasis**] *Bull. Soc. Path. Exot.* 1960, Sept.–Oct., v. 53, No. 5, 793–8, 1 fig. & 2 pls. [12 refs.]

100 patients in the Kasr El Aini Hospital in Cairo with schistosomiasis were examined for changes in the electrophoretic pattern of their serum protein and a particular distinction was made between those with a high, and those with a low, eosinophil count. The gamma globulin values were raised in all cases but were rather higher in those with a high eosinophil count. The same applied to the alpha 1 globulins.

It is sometimes difficult to decide, when a patient has a high eosinophil count whether the cause is the schistosome or the liver fluke. In eosinophilia due to the second parasite the gamma globulin rise is less marked and the alpha 1 globulin is virtually normal. Thus electrophoresis of the serum might help in the differential diagnosis of eosinophilia under these conditions.

H. Lehmann

SADUN, E. H., WILLIAMS, J. S. & ANDERSON, R. I. **Fluorescent Antibody Technic for Sero-Diagnosis of Schistosomiasis in Humans.** *Proc. Soc. Exper. Biol. & Med.* 1960, Nov., v. 105, No. 2, 289–91. [11 refs.]

A technique is described for the serodiagnosis of schistosomiasis. Briefly, a formolized suspension of cercariae of *S. mansoni* is mixed with the patient's serum and stood 30 minutes at 23°C. After being washed the cercariae are treated with anti-human globulin labelled with fluorescein for 15 minutes, washed, and suspended in 90% glycerin for examination under ultra-violet light.

Of 88 sera from *S. mansoni* patients, 67 were positive, 13 doubtful and 8 negative. Of 18 sera from *S. haematobium* patients, 12 were positive, 5 doubtful and 1 negative. Of 11 sera from trichinosis patients 9 were positive and 2 negative. But with 20 sera from other worm infections all were negative and so were 50 sera from miscellaneous other conditions. Of 39 healthy sera, 1 was positive, 3 doubtful and 35 were negative.

Further study of this test is recommended by the authors.

[See also this *Bulletin*, 1960, v. 57, 1282.] *F. Hawking*

FORSYTH, D. M. **Practical Difficulties in the Treatment of Schistosomiasis in an Arab Community. Part II.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1961, Mar., v. 55, No. 2, 168–77, 2 figs. on pl. & 1 diagram. [19 refs.]

Pursuing his previous studies on this subject [this *Bulletin*, 1959, v. 56, 317 and 633] the author has treated 220 patients suffering from *Schistosoma haematobium* and 30 from *S. mansoni* infections; no cases of infection with both parasites have been detected. Of his original series of 54 patients treated for the urinary disease 26 patients considered to have had their infections eradicated are still in Kuwait; 6 of these appear completely to have been cured of the condition, but 12 suffer anatomical changes of significance and another 5 have obvious permanent damage to the urinary tract which will demand surgical relief. The test of cure adopted (urine examination on 3 successive days 3 weeks, 6 weeks and 3 months after treatment) has proved reliable; none of those judged cured by this test and continuing under observation has relapsed.

35 patients were treated with either potassium or sodium antimony tartrate given on alternate days for 30 days; 9 defaulted before completion of the treatment; 21 were cured, 2 relapsed, 1 died and another 2 disappeared after treatment. Electrocardiographic [ECG] tracings were made before and after treatment, but no significant differences between them were noted. The patient who died had seemed to tolerate the treatment well but suddenly collapsed 24 hours after the last injection.

100 patients were treated with sodium antimony gluconate. 60 were given intravenous injections of 225 mgm. daily for 6 days; 18 defaulted, 34 were cured and 8 relapsed. In 42 of these patients significant changes were noted in the ECG tracings after treatment. Another 34 were given intravenous injections of 337·5 mgm. daily for 4 days; 7 defaulted, 21 were cured, 5 relapsed and one died 2 days after treatment from circulatory failure. In nearly all the ECG tracings were changed after treatment. Yet another 6 patients were given this last course of treatment together with lucanthone hydrochloride; 3

defaulted, 2 were cured and one died 2 weeks after completion of treatment, the cause of his death being in doubt. This combined course was so badly tolerated that it was abandoned.

Some other small groups of patients were given conventional courses of treatment with stibophen, with Anthiomaline, with a 5-injection course of tartar emetic, with a 5-injection or with a longer course of lucanthone hydrochloride, but the results of each were so unsatisfactory that these treatments were abandoned.

Lastly, 12 patients were treated orally with Ciba 17581 (the hydrochloride of 1-β-diethylamino-ethylamino-4, 6, 8-trimethyl-5-azathioxanthone) at a level of 10 mgm./kgm. daily for 20 days; 6 defaulted during or after treatment, 3 were cured and 3 relapsed.

Though the reactions to sodium antimony gluconate in this series of patients were more severe than was expected from the records of others [this *Bulletin*, 1951, v. 48, 49, 480 ; 1954, v. 51, 1171 ; 1957, v. 54, 306] the author was impressed by the results of the 6-day course of treatment with this drug and considers it the treatment of choice even for *S. mansoni* infections. In the event of relapse a course of tartar emetic treatment can be given, but before antimony treatment is repeated an ECG is desirable.

Since his previous communication [*loc. cit.*] the introduction of water irrigation schemes has transformed some areas in Kuwait. There is no direct evidence of local acquirement of schistosomiasis so far but its possibility clearly merits attention. The eggs of *S. haematobium* recovered from patients seen in this area appear to be longer and thinner than those of the classical dimensions. *A. R. D. Adams*

SENFT, A. W., PHILPOTT, D. E. & PELOFSKY, A. H. **Electron Microscope Observations of the Integument, Flame Cells, and Gut of** *Schistosoma mansoni*. *J. Parasitology*. 1961, Apr., v. 47, No. 2, 217–29, 8 pls. [12 refs.]

RICHARDS, C. S. **Another Potential Intermediate Host Snail for** *Schistosoma mansoni* **in Puerto Rico.** [Research Notes.] *J. Parasitology*. 1961, Feb., v. 47, No. 1, 64.

In Puerto Rico it has not been possible hitherto to infect snails other than *Australorbis glabratus* with *Schistosoma mansoni* which would develop to the stage of cercarial production. The author collected *Tropicorbis riisei* (which may be *T. peregrinus* or *T. havanensis*) from a pond in Florida, Puerto Rico, and exposed one of these snails to miracidia from the faeces of a mouse infected with *S. mansoni*. The head region was penetrated and cercariae were released in 22 days but proved not to be those of *S. mansoni*: however, on the 34th day cercariae of *S. mansoni* were released and shed for 5 days, after which the snail died. The snail had already laid eggs and 2 offspring were again exposed to miracidia from the same source on 6 occasions from December 1959 to May 22nd, 1960. On June 2nd larval stages developed in both snails in the head, neck and foot and one snail shed cercariae, but the other died on that

day. Although the first 4 exposures had been unsuccessful it would seem that they had had some influence on the subsequent successful infection.

H. J. O'D. Burke-Gaffney

BARROS, J. & BORROTCHIN, M. A esplenoportografia na esquistossomose mansônica. Comprovação *in vivo* do manguito de neoformação vascular periporta intrehepático na forma hépatoesplênica. Nota prévia. [**Splenoportography in *Schistosoma mansoni* Infection (Preliminary Note)**] *Rev. Assoc. Med. Minas Gerais.* 1960, Sept., v. 11, No. 3, 185–9, 9 figs. English summary.

The authors carried out splenoportography on 4 patients suffering from the hepato-splenic form of *Schistosoma mansoni* infection, using as contrast medium 40 ml. of 70% Cilatrast.

The subsequent X-ray examinations showed a definite vasculo-connective tissue cuff of varying width and thickness in the intrahepatic portal spaces of veins of the second and third order, giving an appearance of there having been leaks of the contrast medium into the periportal area.

This appearance agrees well with what had been found previously by BOGLIOLO [this *Bulletin*, 1959, v. 56, 66] on post-mortem portoradiography, and may well be specific for the Symmers type of lesion, but the authors advise further splenoportograms in other forms of hepatic fibrosis before this can be regarded as characteristic. *W. K. Dunscombe*

MAGALHÃES, A., Jr., MENEZES, H. & COELHO, R. de B. Patogênese da fibrose hepática na esquistossomose mansoni (estudo des alterações vasculares portais mediante modêlo plástico). [**Pathogenesis of Hepatic Fibrosis in *Schistosoma mansoni* Infection. Study of Changes in the Portal Vessels by Means of a Plastic Model**] *Rev. Assoc. Med. Brasileira.* 1960, Aug.–Oct.–Dec., v. 6, No. 4, 284–94, 21 figs. & 1 diagram. [19 refs.] English summary.

The authors, from Recife, Brazil, studied the liver cirrhosis in schistosomiasis by injecting the portal vein, hepatic arteries and hepatic veins with a plastic solution (Vinilyte) and, after a long period of maceration of the liver parenchyma, studying the plastic casts thus obtained. These were compared with microscopic sections from various areas of normal and cirrhotic livers.

Livers were obtained at autopsy from 10 cases of schistosomal cirrhosis (Symmers type), 5 of the Laennec type and from 3 normal livers. The results are discussed fully and illustrated with photomicrographs and diagrams.

The principal findings were as follows:—

(1) Small branches of the portal vein were occluded by dead parasites, with consequent endophlebitis.

(2) Hepatic cells related to the occluded area were atrophied and this was followed by collapse of the reticulum.

(3) In these areas, there were bands of proliferative fibrosis and newly formed capillaries and biliary ducts.

(4) The plastic casts revealed severe distortion of the portal system, absence

of many small branches and arrangement of the newly formed capillaries in a network around the large portal veins in the fibrotic areas.

[See also this *Bulletin*, 1959, v. 56, 66.] *H. J. O'D Burke-Gaffney*

i. STRETCH, S. J. E., STRETCH, R. G. A., LEYTHAM, G. W. H. & KERSHAW, W. E. **Discrimination Learning and Schistosomiasis in the Rat: a Low-Grade Infection of Several Months' Duration.** *Ann. Trop. Med. & Parasit.* 1960, Dec., v. 54, No. 4, 483–6, 3 figs.

ii. STRETCH, R. G. A., LEYTHAM, G. W. H. & KERSHAW, W. E. **The Effect of Acute Schistosomiasis upon Learning in Rats under Different Levels of Motivation.** *Ibid.*, 487–92, 3 figs.

i. In a previous paper KERSHAW *et al.* [this *Bulletin*, 1960, v. 57, 822] showed that albino rats acutely infected with *Schistosoma mansoni* learned the correct route through a maze less readily than uninfected rats. In the present experiment 12 hooded rats were exposed to 500 cercariae each of *S. mansoni*, 18 weeks before training in a maze began. The rats had to go through a maze to get food. It was found that there was no difference between the infected and uninfected groups of rats in the rate at which they learnt the way through the maze. At post mortem only 6 of the infected rats contained worms (average 4 each) and no eggs were found in any of the livers. It was not clear whether this difference from the previous results was due to the lightness of infection, chronicity and possible immunity, or to a greater resistance of hooded rats compared with albino rats.

ii. In other experiments the rats were tested by the speed at which they swam 3½ feet under water after having been submerged for 5 sec. (low drive), for 10 sec. (moderate drive), or for 15 sec. (high drive). Half the rats were infected 28 days earlier by *S. mansoni* (and when killed after the experiments they contained an average of 8–10 worms per rat, mostly in the liver). Under low drive conditions, the learning of infected animals was slightly retarded compared with the uninfected; but at moderate and high drive there was no significant difference (in fact, the infected rats learned slightly more quickly). It is tentatively concluded that low grade schistosomiasis tends to reduce an animal's motivation to solve a problem rather than to affect learning ability *per se.* *F. Hawking*

ERRATUM

In the abstract of the paper by Dr. Z. BRENER entitled "Chemotherapy of Experimental Schistosomiasis. III. Comparative Drug Activity of Some Antimonial Compounds in Mice experimentally infected with *Schistosoma mansoni*", published in this *Bulletin*, 1961, v. 58, 338, the sentence beginning on the second line should read:

"After 35 days they were treated with drugs by intraperitoneal injection daily for 5 days: after 5 days' rest they received a second course of treatment lasting for 5 days and were killed for examination 7 days after the last dose of this second series".

CHOW, Lien-Pin. **Intradermal Test for Schistosomiasis in a New Breeding Area of *Oncomelania formosana* in Southern Taiwan with Historical Review of Schistosomiasis Studies in Taiwan.** Reprinted from *Formosan Sci.* 1960, Aug., v. 14, No. 3, 121–32, 1 map. [29 refs.]

The occurrence of human schistosomiasis in Taiwan (Formosa) so far has never been authenticated, though *Oncomelania formosana* occurs there and domestic and small wild animals have repeatedly been found to be infected with *Schistosoma japonicum* in some parts of the territory since 1914. Exposure of 4 human volunteers to schistosome cercariae obtained locally did not result in the establishment of an *S. japonicum* infection in them, and the local strain of this worm is thought to be zoophilic and incapable of maturation in man [this *Bulletin*, 1957, v. 54, 314].

In view of the obvious importance of decision on this matter further studies have been undertaken in the form of intradermal testing of villagers with an antigen prepared from adult *S. japonicum*. 1,014 inhabitants of 2 villages were thus examined, in conjunction with stool examinations; in none of the latter specimens were schistosome eggs found, but 8 (0·79%) of the 1,014 patients clearly reacted positively to the skin test. Re-examination of the stools of these 8 positive reactors again failed to reveal schistosome eggs, though the presence of a *Clonorchis sinensis* infection was established in 4 of them.

Stools of 50 buffaloes and 19 pigs in these villages were searched for schistosome eggs; no infections with schistosomes were found in them. Some 6,000 *Oncomelania formosana* collected locally were dissected; none of these showed infection with the parasite.

It therefore is evident that there is no *S. japonicum* infection in the villages investigated, and that the clear positive intradermal reactions given by some villagers to a schistosome antigen were the result of *C. sinensis* infection. [Such cross reactions with trematode infections are known to occur. See SADUN and BUCK, *ibid.*, 1961, v. 58, 601.]

A. R. D. Adams

HSÜ, S. Y. L. & HSÜ, H. F. **New Approach to Immunization against *Schistosoma japonicum*.** *Science.* 1961, Mar. 17, v. 133, 766.

In previous work [this *Bulletin*, 1957, v. 54, 314] the authors have described a non-human (Formosan) strain of *Schistosoma japonicum* which naturally terminates its infection in the schistosomula stage in man and which does not produce harmful effects. Investigations were made to see if this strain would produce immunity against infection with a pathogenic human strain. For this purpose 11 rhesus monkeys were inoculated with 2,000–12,000 cercariae of the non-pathogenic Formosan strain. Later the monkeys were infected with 200 male and 200 female cercariae of a pathogenic Japanese strain and from the 30th day onwards the stools were examined for eggs, counts being made.

In the immunized monkeys the maximum number of eggs per gm. faeces per day ranged from 0 to 1,634 and the average daily output of eggs during the first 30 days ranged from 0 to 308. In 4 control (non-immunized) monkeys the maximum number of eggs per gm. faeces per day ranged from 15,000 to

88,000 and the average daily output from 1,200 to 46,000. Accordingly it is concluded that exposure to the non-pathogenic cercariae had produced considerable immunity even though the cercariae had never grown into mature worms and never produced eggs. It is hoped that this procedure will lead to a practical immunization against *S. japonicum*. [See also this *Bulletin*, 1961, v. 58, 84.] *F. Hawking*

LAGRANGE, E. Une méthode simple d'essai des anti-bilharziens *in vitro*. [**A Simple Method for Testing Antischistosome Drugs** *in vitro*] *C.R. Soc. Biol.* 1960, v. 154, No. 7, 1498–9.

Tests can be carried out on cercariae *in vitro*. Thus lucanthone (Miracil) at 1 : 40,000–1 : 2,000,000 kills cercariae *in vitro* in 5–10 minutes, after a period of paralysis; in 1 : 20,000,000 it kills them in 1–2 hours. [Apparently at room temperature.] Nile blue has the same action. On the other hand, many compounds such as antimonials apparently have no action *in vitro*.

In vitro tests can also be made with miracidia. These are killed in half an hour by 1 : 400,000 lucanthone. Nile blue is also active. Living eggs are not appreciably affected by these substances. Miracil and Nile blue 1 : 50,000 also kill adult schistosomes almost instantly. On the other hand these substances are relatively non-toxic for mice which tolerate 0·5 mgm. Nile blue sulphate per 20 gm. mouse intravenously or 1·0 mgm. intraperitoneally.

Many other compounds have been tested on cercariae *in vitro*. Only the oxazines are clearly active. Cresyl violet, cresyl blue, and gallocyanine have a slight action; the naphthalenic oxazines are more active, especially Meldola blue.

If Nile blue is injected into healthy mice, it is decolorized and excreted in the urine in a colourless form; but in infected mice it is not decolorized and persists in the stained viscera for several days, apparently because the hypertrophied and cirrhotic liver cannot reduce it.

The *in vitro* test is rapid and convenient and it is suitable to test many compounds in a short time; but it cannot replace the classic *in vivo* test because it would miss many therapeutically active compounds. *F. Hawking*

MISAKI, S. [**Studies on the Fine Structure of Cercariae of** *Trichobilharzia physellae* **(Talbot 1936) and** *Trichobilharzia ocellata* **(LaValette 1855)**] *Japanese J. Parasit.* 1960, Dec., v. 9, No. 6, 744–59, 6 text figs. & 27 figs. on 4 pls. [22 refs.] [In Japanese.] English summary.

IWAKAMI, S. [**Studies on Schistosome Dermatitis in Dozen Region in Oki Islands. I. The Development of** *Trichobilharzia physellae* **in** *Lymnaea japonica* **found in Oki Islands**] *Japanese J. Parasit.* 1960, Dec., v. 9, No. 6, 760–67, 16 figs. on 3 pls. [17 refs.] [In Japanese.] English summary.

IWAKAMI, S. [**Studies on Schistosome Dermatitis in Dozen Region in Oki Islands. II. On Clinical Symptoms, Epidemiology and Prevention of Paddy-Field Dermatitis in Oki Islands**] *Japanese J. Parasit.* 1960, Dec., v. 9, No. 6, 768–77, 12 figs. [In Japanese.]

The English summary appended to the paper is as follows:—

"Dermatitis in Oki Island is caused by the cercaria of an avian schistosome, final and intermediate host of which are teal duck, *Querquedula crecca crecca* and a fresh water snail, *Lymnaea japonica* respectively. Present author attempted to develop a suitable control measure on the basis of clinical and epidemiological information on this dermatitis in Dozen region, Oki Islands. To lay a foundation towards such an approach, a study was undertaken and is reported below:

"1) Dermatitis in Dozen region, Oki Islands is characterized by the rapid development of urticarial wheal accompanied with an intense itching, which develops in the limbs on contact with infected water.

"2) Out of 505 persons who are working in the paddy-field in this region, 194 persons (38·2%) experience such a dermatitis, which occurs from May to October, especially very frequently in the rice-planting season.

"3) The fact that no dermatitis occurs in the persons working in the paddy-field without *Lymnaea japonica* indicates that dermatitis in Oki Islands is due to the dermatitis-producing schistosome cercaria.

"4) *Lymnaea japonica* do not survive on and in the dry soil for more than seven days. And all these snails were destroyed by the use of PCP-Na (1:50,000) and Parathion (1:5,000) solution. Ploughing deeply, keeping the paddy-field dry and the use of chemicals above mentioned were considered an effective control measure against snails."

ISHIDA, H. [**Studies on the Dermatitis-Producing** *Cercaria mieensis* **n. sp. in Man. I. On the Eggs of an Avian Schistosoma Newly Found in** *Querquedula crecca crecca* **in Nagashima, Mie Prefecture**] *Japanese J. Parasit.* 1960, Dec., v. 9, No. 6, 717–23, 6 figs. [29 refs.] [In Japanese.] English summary. [**II. On** *Cercaria mieensis* **n. sp. Developed from Eggs of an Avian Schistosome**] *Ibid.*, 724–9, 5 figs. [12 refs.] [In Japanese.] English summary (9 lines). [**III. On the Pathogenicity of** *Cercaria mieensis* **n. sp.**] *Ibid.*, 730–34, 6 figs. [17 refs.] [In Japanese.] English summary (7 lines).

ABENTE HAEDO, F., RODRIGUEZ DEVINCENZI, A. M., OSIMANI, J. J. & MESCIA, W. Un brote epidémico, en Florida, de distomatosis humana por *Fasciola hepatica*. [**An Epidemic Outbreak, in Florida (Uruguay), of Human Distomatosis from** *Fasciola hepatica*] *An. Facul. de Med. Montevideo.* 1960, v. 45, Nos. 5/6, 319–29, 2 figs.

The English summary appended to the paper is as follows:—

"The authors study an epidemic outbreak of thirty-one cases of human Distomatosis caused by *Fasciola hepatica*, acquired through the ingestion of

raw watercress and polluted water of dells and brooks, as a consequence of the 1959 floods, taking into consideration the symptomatology, diagnosis, pathological anatomy, prophylaxis and treatment of the disease."

RUBIO, Mafalda, OLIVOS, P. & PUGA, F. Nuevos casos de distomatosis o fascioliasis hepática en niños. [**New Cases of Hepatic Fascioliasis in Children**] *Bol Chileno de Parasit.* 1961, Apr.–June, v. 16, No. 2, 38–41. [13 refs.] English summary.

An account of four cases.

METTRICK, D. F. *Taenia madagascariensis* **Davaine, 1870, a Cestode Parasite of Man, Rodents and Other African Mammals.** *Central African J. of Med.* 1961, Mar., v. 7, No. 3, 83–4. [15 refs.]

The taxonomic position of *Taenia madagascariensis* has never been settled convincingly. It has been confused with *Raillietina celebensis*, but BAER and SANDARS have shown these 2 species to be distinct [this *Bulletin*, 1956, v. 53, 1453]. *T. madagascariensis* was considered by BAER to be a synonym of *Inermicapsifer arvicanthidis* [*ibid.*, 1957, v. 54, 184], a common cestode parasite of Central African rodents which has also been found in man in Kenya [*ibid.*, 1949, v. 46, 952] and in the Congo [*ibid.*, 1951, v. 48, 174; 1955, v. 52, 1210]. FAIN [*ibid.*, 1951, v. 48, 174] believed *I. cubensis* to be a synonym of *I. arvicanthidis*. More than 100 cases of *I. cubensis* have been recorded in Cuba (KOURI *et al.*, *Acta Trop.* Basle, 1949, v. 6, 127) in young patients and it is considered that it was introduced from Africa during the slave trade [BAER, *loc. cit.*].

The present author, working with WEIR (unpublished) found much variation in populations of the genus *Inermicapsifer* in the same host and thinks it likely that many species are synonymous. They have studied more than 300 specimens from mammals in Rhodesia and have had to amend the generic definition. In a paper under publication the present author lists the host range found in the Federation and this includes 2 further Orders, bringing the number up to 5 (Hyracoidea, Rodentia, Primates and now Carnivora and Nomarthra).

JOYEUX and BAER [this *Bulletin*, 1929, v. 26, 975] suggested that most of the rare species of tapeworms in man are probably parasites of other mammals: but man seems to be the only host of *I. arvicanthidis* in Cuba and the cestodes of Cuban rodents belong to other species and genera.

Many rodent *Raillietina* have been identified in Rhodesia and there seems to be no reason why human infections with this genus and with *I.* (=*Taenia*) *madagascariensis* should not be present also. The author would welcome any relevant material and information regarding these infections and for the benefit of readers he gives the following brief description of the typical structure of *I. madagascariensis*:

"Worms 150–200 mm. long by 2–3 mm. wide. Scolex unarmed, with no rostellum. Mature segments wider than long, but gravid segments tending to be square. The genital pores are usually unilateral opening in the mid-lateral region of the segment.

"In gravid segments the uterus is replaced by 90–150 egg capsules, each containing 4–10 eggs. Detached gravid segments are found in the faeces and have been described as 'small white motile organisms.' The gravid segments are smaller than those of *Taenia* spp., but larger than *Hymenolepis* spp., apart from differing in the internal anatomy." *H. J. O'D. Burke-Gaffney*

RAUSCH, R. L. **Recent Studies on Hydatid Disease in Alaska.** *Parassitologia.* Rome. 1960, Dec., v. 2, No. 3, 391–8, 2 figs.

Of the population of 220,000 people in Alaska, 40,000 comprise aboriginal Indians, Eskimos and Aleuts who live in the remoter part of the country and many in conditions which favour transmission of helminthic diseases. Investigation of these during 1949–1960 revealed 41 cases of cystic hydatid disease and 10 of alveolar hydatid.

Cystic Hydatid Disease. The wolf and wild ungulates are the natural hosts of *Echinococcus granulosus* in the region, while hunting dogs and deer are the important factors in the animal-man transmission. On the Arctic coast, 10% of dogs were found infected in some villages and in the interior there was an infection rate of 22%. Diagnosis of this disease in people was incidental to routine roentgenological examination for pulmonary tuberculosis. Serological tests were found to be of little value. Pulmonary and hepatic infections only were found, in the ratio of 30 to 10 respectively. The disease is widely distributed.

Alveolar Hydatid Disease. The natural hosts are foxes (*Alopex* and *Vulpes*) and microtine rodents. Sledge dogs are probably the source of human infection; on St. Lawrence Island 5 of 89 dogs were found positive on autopsy. The 10 recorded cases of human infection are all in Eskimos, of ages from 22 to 73 years, in whom the liver was the main site, but in 2 the brain also was infected. (Details of clinical findings, treatment and results are given in a table.) There is no reliable technique for diagnosing early cases and even advanced cases may be overlooked; in the latter, prognosis is poor. "*Echinococcus multilocularis* evidently is restricted in its distribution to the tundra biome of northern and western Alaska, including certain islands in the Bering Sea."

J. J. C. Buckley

KILEJIAN, A., SCHINAZI, L. A. & SCHWABE, C. W. **Host-Parasite Relationships in Echinococcosis. V. Histochemical Observations on** *Echinococcus granulosus*. *J. Parasitology*. 1961, Apr., v. 47, No. 2, 181–8, 1 text fig. & 12 figs. on 3 pls. [18 refs.]

GOODCHILD, C. G. & KAGAN, I. G. **Comparison of Proteins in Hydatid Fluid and Serum by means of Electrophoresis.** *J. Parasitology*. 1961, Apr., v. 47, No. 2, 175–80, 4 figs. [18 refs.]

HABER, R. W., JOSEPH, M. & GRANT, A. F. **Pulmonary Hydatid Disease.** *Med. J. Australia*. 1961, Mar. 11, v. 1, No. 10, 366–71, 1 fig. [19 refs.]

A full account of the incidence, symptoms, diagnosis, surgery, follow-up and prevention of pulmonary hydatid disease, based on 72 cases seen in the Royal Prince Alfred Hospital, Sydney, between 1945 and 1960.

FIERRO, J., DONOSO, P. & FAIGUENBAUM, J. Hidatidosis de la columna vertebral. Estudio y consideraciones sobre 10 casos clínicos. [**Hydatid Disease of the Vertebral Column. Study and Considerations on 10 Clinical Cases**] *Bol. Chileno de Parasit.* 1961, Apr.–June, v. 16, No. 2, 30–34. [11 refs.] English summary.

YAMASHITA, J. **On the Susceptibility and Histogenesis of** *Echinococcus multilocularis* **in the Experimental Mouse, with the State of Echinococcosis in Japan.** *Parassitologia.* Rome. 1960, Dec., v. 2, No. 3, 399–406.

A comparison was made of the susceptibility of different uniform strains of mice to experimental infection with *Echinococcus multilocularis* and remarkable differences were observed—from 8 to 100%. It was also found that the hydatid in these hosts could be classified in two types.

In the first type, which occurred in 2 mouse strains, " the hydatid tissue develops rapidly and multilocular tissue composed of numerous large cysts as large as several millimeters is established within 2 months when brood capsule and scolex formation is already taking place. The germinal layer develops well and becomes thick. Host tissue reaction against the hydatid is slight ". In the second type which occurred in 11 mouse strains, " the hydatid develops slowly, although often becomes severe in prolonged cases. The animals require a long time before fully developed brood capsules and scolices can be found ". The time taken for these to appear is 5 and 7 months respectively. The hydatid tends to be complicated, owing to daughter cyst formation. The cysts are usually very small. Host tissue reaction is severe. This type seems to be in the same category as human multilocular hydatid.

[There follows a long, detailed, unillustrated account of observations made by the author's Assistant Professor, Dr. M. OHBAYASHI, on the histogenesis of multilocular echinococcosis. This section should be read in the original by those interested.]

In Japan, both unilocular and multilocular echinococcosis are present as human infections. Of the former, 50 cases are on record, representing 64% men and 36% women. The organs affected were liver (38 cases), lung (4), spleen (2), kidney (1), other parts (7). Of the multilocular form, 43 cases are on record, 60·6% in men and 39·4% in women, in all of whom the liver was affected, but 3 were also in the lung and one in lung and cerebrum.

Hydatid infections of domestic animals have rarely been recorded, and in sheep and pig only. Adult worms have been recorded, rarely, in cat and dog. In wild animals, 3 blue foxes were found infected, 2 of them with multilocular cysts on liver or lung. The vole, *Microtus oeconomus*, was once found infected. Another kind of vole, *Clethrionomys* sp., is suspected, as it has been heavily infected experimentally. *J. J. C. Buckley*

GILLES, H. M., WATSON-WILLIAMS, E. J. & WORLLEDGE, S. M. **A Note on the Treatment of *Necator americanus* Infections with Bephenium Hydroxynaphthoate.** *Ann. Trop. Med. & Parasit.* 1961, Apr., v. 55, No. 1, 70–72, 1 fig.

In this short report the authors, from the Department of Medicine and Pathology, University College, Ibadan, Nigeria, and the Liverpool School of Tropical Medicine, record the treatment of 50 patients in the University College Hospital general practice clinic, Ibadan, who were suffering from *Necator americanus* infection. The object was to study the value and any toxic effects of bephenium hydroxynaphthoate, which was given in a dose of 2·5 gm. base early in the morning on an empty stomach. After 2 hours, the patients were sent home and asked to return on the two following days, when the routine was repeated. Follow-up was frequent, in some cases for a year.

The only toxic effect noted was vomiting, which occurred in 4 patients; even though the average haemoglobin level was only 3·5 gm. per 100 cc. it is evident that toxicity was low.

The study suggested that in heavy infections a minimum of 3 doses was necessary to produce a substantial reduction in egg counts. This point will be developed further in another publication: meanwhile this schedule has been adopted for out-patients.

A table shows that in the 50 patients the mean egg count per ml. of faeces was reduced by 81% three weeks after treatment. Radioactive tracer studies of blood loss were carried out on "several" patients and the reduction in blood loss after the vermifuge was striking. A figure depicts an example of one patient in whom there were blood losses of 83–160 cc. daily in the faeces in the week before treatment, while no blood was detected for 38 days after treatment, except for 7 cc. on the 36th day.

These results, and the low toxicity, are in accord with the experience of others [this *Bulletin*, 1960, v. 57, 924 *bis*]; but the authors stress their opinion that in heavy infections by *Necator*, more than one dose is necessary for adequate treatment. *H. J. O'D. Burke-Gaffney*

BAKER, L. A., SORIANO, J. & GARCIA, A. **Clinical Trials with Bephenium Hydroxynaphthoate (Alcopar) against Hookworm and Ascaris Infestation in Man.** *J. Philippine Med. Ass.* 1961, Jan., v. 37, No. 1, 30–35.

Further evidence of the efficacy and low toxicity of bephenium is produced by the authors from the Philippines.

26 patients passing hookworm ova (the species is not definitely stated) in their stools were treated with 5 gm. Alcopar (2½ gm. bephenium base) for 4 successive mornings on an empty stomach. Ova counts per gm. faeces were made before and 4 days after completion of treatment. The effect on ova counts of *Ascaris* and *Trichuris* was also noted.

Of the 26 patients the ova count was reduced by 70% or more in 19, and the stools cleared in 13 (a 73% success). A further course was successful in 1 more patient out of 3 treated, but 1 was not improved by 3 courses. Only 4 patients complained of side effects: nausea, vomiting, and borborygmi. In 2 of these treatment had to be discontinued.

Of 15 patients with *Ascaris*, 10 (66·7%) showed a 70% reduction in ova count, but of 21 with *Trichuris* only 11 (52%) showed this reduction after one course, confirming the resistance of this worm. *A. C. E. Cole*

Komiya, Y., Ishizaki, T., Kutsumi, H. & Kumada, M. [**The Anthelmintic Effect of Bephenium Hydroxynaphthoate on** *Necator americanus*] *Japanese J. Parasit.* 1960, Dec., v. 9, No. 6, 706–10. [11 refs.] [In Japanese.] English summary.

45 patients in Tokyo with ankylostomiasis (mostly *Necator americanus* infections) received 2 doses of bephenium hydroxynaphthoate, each consisting of 2·5 gm. base, at one hour's interval. Stool examinations 3 weeks later showed that 48·3% were cleared of hookworm ova. Side effects, though common, were mild. *H. J. O'D. Burke-Gaffney*

Thitasut, P. **Action of Aqueous Solutions of Iodine on Fresh Vegetables and on the Infective Stages of some Common Intestinal Nematodes.** *Amer. J. Trop. Med. & Hyg.* 1961, Jan., v. 10, No. 1, 39–43. [24 refs.]

Suspensions of infective larvae of *Ancylostoma caninum*, *Necator americanus* and *Strongyloides stercoralis*, and of embryonated eggs of *Ascaris lumbricoides*, *Toxocara canis* and *Trichuris muris* were exposed to aqueous solutions of iodine. The solutions were prepared from proprietary tablets for disinfecting water; the free iodine was estimated with a starch-iodine " test kit ".

The parasites were examined microscopically at 5- to 10-minute intervals to determine the time taken for the larvae to become immobile and stained with iodine.

Hookworm and *Strongyloides* larvae were killed in 5 minutes or less at 15 to 30°C. by solutions containing 70 p.p.m. of free iodine. The larvae in the more resistant eggs of *Ascaris*, *Toxocara* and *Trichuris* were killed by 100 to 250 p.p.m. The lethal action was more rapid at 15°C. than at higher temperatures; no explanation for this rather unusual observation is given.

The flavour and appearance of green and root vegetables were not adversely affected by concentrations of 500 to 1,000 p.p.m. and the author therefore recommends the use of iodine solutions containing 250 p.p.m. for washing fresh vegetables in regions in which human faeces are used as a fertilizer. The solution also kills the common pathogenic bacteria. *L. G. Goodwin*

Sasa, M., Shirasaka, R., Tanaka, H., Miura, A., Yamamoto, H. & Katahira, K. **Observation on the Behavior of Infective Larvae of Hookworms and Related Nematode Parasites, with Notes on the Effect of Carbon Dioxide in the Breath as the Stimulant.** *Japanese J. Exper. Med.* 1960, Dec., v. 30, No. 6, 433–47, 2 figs. [16 refs.]

This paper describes careful and ingenious experiments on infective hookworm larvae. A cone was made of plaster of Paris and charcoal about 3 cm. high with a hole at the apex in which hookworm larvae were placed. The cone

was put in a glass case and the larvae could be observed with a low power microscope, although isolated from the outside environment. The movements of the larvae were greatly influenced by the amount of water present. But if optimum amounts were present they stood erect; and if isolated from stimuli they remained immobile. This applied to *Ancylostoma caninum*, *Nippostrongylus braziliensis*, *Trichostrongylus orientalis* and *Necator americanus*. Infective larvae of *A. duodenale* and *Strongyloides stercoralis* crawled over the surface in snake-like or loopworm-like poses.

All these larvae were stimulated into activity if expired air was blown over them, and it was shown that the active constituent of the air was carbon dioxide. The minimum effective concentration of carbon dioxide was about 0·18–0·27%. The worms reacted, but in a different way, to the vapour of methyl alcohol, acetone, ether, chloroform, formaldehyde and ammonia, but not to ethyl alcohol, acetic or lactic acids; these seem to act as toxic or irritant substances, quite different to carbon dioxide. The worms also reacted quickly to mild radiant heat, but not to light, moderate air currents, sound or vibration. It is concluded that these infective larvae are probably attracted to potential hosts by the carbon dioxide of expired air; (probably warmth is also stimulatory).

[See also this *Bulletin*, 1958, v. 55, 463.] *F. Hawking*

YOSHIDA, Y., OKAMOTO, K., HIGO, A. & IMAI, K. **[Studies on the Development of *Necator americanus* in Young Dogs]** *Japanese J. Parasit.* 1960, Dec., v. 9, No. 6, 735–43, 20 figs. on 2 pls. [11 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

"The normal definitive host of *Ancylostoma duodenale* is man, although some authors have recorded the cases of natural infection of this species from some mammals (pig, tiger, lion, cat, dog etc.). Attempts of experimental infection of this species to the animals have been made by many authors, and some of them have reported that a small number of the worms reached maturity in quite young dogs and cats. Recently, Yoshida and Okano (1959) reported that a large number of worms of this species reached maturity in young dogs and oviposition began during 28–36 days after the oral infection.

"On the other hand, *Necator americanus* also normally infects man only, although some authors have reported the natural infections of this species from the chimpanzee, gorilla etc. Experiments of artificial infection of animals with larvae of *N. americanus* have been made by Lutz (1885) on pigs, by Siccardi (1905) on dogs, by Smith (1903) on dogs, by Oiso (1929) on dogs, rabbits, guinea pigs and mice, by Schwartz *et al.* (1934) on guinea pigs and by Kamati (1943) on rats and dogs. All of these results showed that the encysted larvae of *N. americanus* infected cutaneously realized a little development but they were far from maturity. Therefore, we had no way of receiving adult worms of *N. americanus* which were fresh and flawless. If we can get those fresh worms without any injury, many experimental studies such as ecological and wormicidal researches will become possible.

"We have carried out the work of artificial infection with *N. americanus* larvae to young dogs (1–3 months old). About 500–1,000 active encysted larvae

of this species which were obtained from a man by the feces cultivation, were put on the abdominal skin with a small quantity of water for about one hour. Exact numbers of penetrated larvae through the skin were obscure. Developmental aspects of the worms examined at the various periods after the infection are as follows:

" (1) 13 days after the infection

" Dogs No. 1 and No. 2 were infected with 500 encysted larvae on the same day, and then both dogs died on the 13th day after the infection. By the autopsy, 158 worms from dog No. 1 and 56 worms from No. 2 were recovered respectively. All worms were 4th-stage larvae in shape, and it was possible to distinuish them male or female as shown in Fig. 1–3. Length and width of the worms were $1,760 \times 127$ μ in dog No. 1 and $1,582 \times 113$ μ in No. 2, in average.

" (2) 26 days after the infection

" Dog No. 3 was infected with 1,000 encysted larvae, and was killed 26 days after the infection. 12 young adult worms (5th-stage) were recovered from the small intestine. Definitive mouth capsule was formed and the cutting plate was seen in all worms. Length and width of the worms were $3,369 \times 197$ μ in average. Photographs of the worm were shown in Fig. 4–7.

" (3) 31 days after the infection

" Dogs No. 4 and No. 5 were infected with 500 encysted larvae, and were killed on the 31st day after the infection. Recovered worm from dog No. 4 was one female which was 6,660 μ in length and 260 μ in width. From dog No. 5, 2 males and 2 females were recovered and the size was 5,650 μ in length and 210 μ in width, in average. All of the worms showed the characters of *N. americanus* morphologically as shown in Fig. 8–11. Female worms had no ova in their uterus.

" (4) 42 days after the infection

" Dog No. 6 was infected with 700 encysted larvae, and was killed 42 days after the infection. 2 female worms were collected from the small intestine. The worms were 7,700 μ in length and 320 μ in width in average. The cutting plate in mouth capsule was distinct as shown in Fig. 12. Eggs in uterus were not yet seen (Fig. 13).

" (5) 45 days after the infection

" Dog No. 7 was infected with 500 encysted larvae, and was killed 45 days after the infection. 1 male and 3 females were recovered. All worms had the characters of typical *N. americanus* morphologically as shown in Fig. 14–17. No eggs were seen either in uterus or in feces.

" (6) 71 days after the infection

" Dog No. 8 was infected with 1,000 encysted larvae, and was killed 71 days after the infection. 1 male and 3 females were collected from the small intestine by the autopsy. All worms were full grown adults and were typical *N. americanus*. The size of worms was 7,000 μ in male and 10,100–10,960 μ in female. Eggs were visible both in uterus of the female worms and in the dog's feces.

" By the results mentioned above, it was decided that the larvae of *N. americanus* could infect and develop to the mature worm in young dogs."

FAIRBAIRN, D. **The *in vitro* Hatching of *Ascaris lumbricoides* Eggs.** *Canadian J. Zool.* 1961, Apr., v. 39, No. 2, 153–62, 5 figs. [19 refs.]

HIGASHIKAWA, H. **[Experimental Studies on Visceral Larva Migrans]** *Shikoku Acta Med.* 1961, Feb., v. 17, No. 1, 1–20, 24 figs. on 4 pls. [97 refs.] [In Japanese.] English summary.

The author writes from the Department of Pathology, Tokushima University School of Medicine. He obtained eggs of *Toxocara canis* from a female worm, cultivated them at 28° or 32°C. for 4 weeks in 1% formalin and gave either 20 or 450 embryonated eggs approximately, mixed with a little grain, as a feed to adult male mice weighing 25 gm. 2 mice were killed at intervals of 3 days to 12 months after infection. Larvae were isolated from the tissue by a modified Baermann apparatus and appropriate tissues were examined histologically.

The larvae did not mature in the tissues of the mice after invading them but persisted for a long time as second stage larvae. After the embryonated eggs hatched in the intestines of the mice, the larvae migrated through the intestinal wall to the liver, brain, lung, muscle, kidney and heart, often in large numbers. Except for the brain, the tissues invaded showed a focal granuloma surrounding the larvae, and these granulomata were seen in 15 days. In the early stages, eosinophils or monocytes were seen in the granulomata, but these were gradually replaced by epithelioid cells and fibroblasts in the more advanced stages. After 240 days, fibrinoid degeneration of collagen was seen and the larvae were surrounded by hard fibrous capsules. In the brain, however, the larvae were usually free and cellular reactions were not conspicuous, except in "certain stage".

It is suggested that in man, ingestion of embryonated eggs of *Toxocara* results in a similar migration of larvae to various organs, where they may remain for many months and produce the peculiar visceral damage and clinical manifestations.

The author adds that no case of visceral larva migrans identified as *Toxocara* invasion of the tissues has been recorded in man in Japan.

[This abstract has been made from the English summary of the paper. Detailed results are shown in tables in the Japanese text.]

H. J. O'D. Burke-Gaffney

SZABÓ, G., NGUYÈN THI TRÚC & LUONG TAN THANH. Contribution à l'étude de la chylurie tropicale (filarienne). **[Study of Tropical (Filarial) Chyluria]** *Acta Med.* Budapest. 1960, v. 16, No. 4, 343–61, 5 figs. [36 refs.]

This article from Vietnam deals with the phenomenon of "milky" urine in patients with filariasis which is due to a fistula between the lymphatic system and the urogenital tract. It is pointed out that although the total protein content of the urine is not high the serum protein levels are considerably decreased. On the other hand although the urine may contain several grammes of lipids the serum lipid level is normal. The electrophoretic pattern of the proteins found in the urine closely resembled those in the serum. *H. Lehmann*

ORIHEL, T. C. **Morphology of the Larval Stages of** *Dirofilaria immitis* **in the Dog.** *J. Parasitology.* 1961, Apr., v. 47, No. 2, 251–62, 17 figs. on 3 pls. [20 refs.]

WILLIAMS, T. R., CONNOLLY, R. C., HYNES, H. B. N. & KERSHAW, W. E. **The Size of Particulate Material ingested by *Simulium* Larvae.** *Ann. Trop. Med. & Parasit.* 1961, Apr., v. 55, No. 1, 125–7, 1 fig.

This is a fuller account of the study previously abstracted [this *Bulletin*, 1961, v. 58, 861].

WILLIAMS, T. R. **The Diet of Freshwater Crabs associated with *Simulium neavei* in East Africa. I. Crabs from West and East Uganda collected by the Cambridge East African Expedition, 1959.** *Ann. Trop. Med. & Parasit.* 1961, Apr., v. 55, No. 1, 128–31, 1 map.

"1. The gut contents of crabs from west and east Uganda, collected by the Cambridge East African Expedition, 1959, were examined in the laboratory to determine the nature of their diet.

"2. *Potamon berardi* and *P. niloticus*, two of the species associated with *Simulium neavei*, proved to be omnivorous, feeding mainly on plant material but taking in animal tissues when they were available.

"3. These results were borne out by observations in the laboratory on live crabs from Uganda and Kenya."

WRIGHT, K. A. **Observations on the Life Cycle of *Capillaria hepatica* (Bancroft, 1893) with a Description of the Adult.** *Canadian J. Zool.* 1961, Apr., v. 39, No. 2, 167–82, 17 figs. [20 refs.]

BECKETT, Evelyn B. & BOOTHROYD, B. **Some Observations on the Fine Structure of the Mature Larva of the Nematode *Trichinella spiralis*.** *Ann. Trop. Med. & Parasit.* 1961, Apr., v. 55, No. 1, 116–24, 2 figs. & 9 pls.

BECKETT, E. B. **Histochemical Changes in Mouse Skeletal Muscle associated with *Trichinella spiralis* Infection.** *Biochem. J.* 1961, Feb., v. 78, No. 2. Proc. Biochem. Soc. 17p–18p.

ZAIMAN, H., MAEIR, D. M. & HOWARD, R. G. **The Absence of Myocarditis in Rats infected with Radiated *Trichinella spiralis*.** *Amer. J. Path.* 1961, May, v. 38, No. 5, 553–9, 2 text figs. & 4 figs. on pl. [12 refs.]

"Exposure to 12,000 or 14,000 r of roentgen radiation effectively abolished the reproductive capacity of *Trichinella spiralis* larvae.

"Only 1 of 36 rats, each inoculated with 4,000 radiated larvae, showed evidence of myocarditis in hematoxylin and eosin stained preparations. Fourteen of 18 rats receiving the same number of nonirradiated *Trichinella* exhibited myocardial lesions."

DEFICIENCY DISEASES

Ko, Hsiu-Hua. **Measurements of the Subcutaneous Fat of Taiwanese Infants and Children with special emphasis on its Value as a Criterion for Nutritional Status.** *J. Formosan Med. Ass.* 1960, Sept. 28, v. 59, No. 9, 991–1002. [26 refs.]

Gallez, A. Contribution à l'étude des populations indigènes congolaises en milieu sous-développé. [**African Populations in Underdeveloped Areas of the Congo**] *Ann. Soc. Belge de Méd. Trop.* 1960, June 30, v. 40, No. 3, 481–510, 15 graphs. [26 refs.]

This study was carried out among the Bankutshu and Babindji peoples in the Congo; the former number about 44,000 and live in the province of Kasai; the latter, numbering about 22,000, are located in Dimbelenge. The social structure, economic background and mode of life of these communities are described, and data are presented about their dietary practices. The staple food of both groups is manioc, so that the diet is deficient in protein. The Bankutshu use red palm oil, which is rich in pro-vitamin A, as a cooking fat, but the Babindji do not, although the palm grows throughout the territory they inhabit.

Data about heights and weights were obtained. Low average weights and heights were found in adult women in both groups, which was ascribed to "unfavourable economic and dietary conditions". Average birth weights were also below those found in Europe and among American Negroes. A longitudinal development study showed retardation in the rate of growth during the first two years of life, due to inadequate supplies of breast milk during early infancy and later to insufficient and unsatisfactory supplementary feeding.

W. R. Aykroyd

Abdou, I. **Nutrition Problems in the Egyptian Region.** *J. Egyptian Pub. Health Ass.* 1960, v. 35, No. 3, 137–44.

This paper was presented at the FAO/WHO Regional Nutrition Committee for the Near East which met in Cairo in 1958. Data are reproduced from annual food balance sheets for the years 1947–48 to 1955–56, relating to *per caput* supplies of the various food groups and of calories, total protein, vegetable protein and animal protein. These figures are interpreted as showing that between the years 1950 and 1956 average daily calorie intake rose from 2,300 to 2,600, and protein intake from 68 to 92 gm. There has been a general increase in food production in Egypt during recent years, accompanied by a decline in food imports. An important recent change in the Egyptian diet has been the gradual replacement of maize by wheat; since 1945 the ratio of wheat to maize has changed from 0·75 to 1·2. The greater consumption of wheat, which is now extending to many rural areas, should reduce the incidence of nutritional diseases, particularly pellagra.

Nutritional anaemia, rickets and pellagra, are the most important deficiency diseases. Anaemia of the hypochromic microcytic type, leading to impairment of health and working capacity, is found in a large proportion of the population. Both parasitic infection and diet deficiency contribute to its causation.

Recent surveys have shown that 13% of children attending Maternity and Child Health centres in Cairo showed clinical signs of rickets. Pellagra is most prevalent in rural areas, but it is less common than in the early decades of the present century, and has assumed a milder form. Ariboflavinosis occurs in children throughout the country, and the occurrence of avitaminosis A has been observed in some areas.

The infant mortality rate in Egypt remains high. Of special significance from the standpoint of nutrition is the high mortality in children aged 1 to 5. Field surveys have demonstrated retardation in growth, beginning in the second half of the first year.

Among the measures to improve nutrition are the supplementary feeding of mothers and young children, school feeding, and the education of the public in better habits of diet. School feeding has a long history in Egypt; according to the author, it dates back to A.D. 696. A Nutrition Institute attached to the Ministry of Health carries out surveys of diet and state of nutrition and nutrition research of various kinds. The Institute advises a National Nutrition Committee associated with the same Ministry which includes workers qualified in nutrition and representatives of other ministries and services. *W. R. Aykroyd*

ABRAMSON, J. H. **Wages, Diet and Nutritional State. A Nutritional Study of Two Groups of Better-Paid Factory Workers in Durban.** *South African Med. J.* 1961, Apr. 1, v. 35, No. 13, 268–72. [19 refs.]

The study reported was an extension of an earlier study [this *Bulletin*, 1961, v. 58, 497] of the diet and state of nutrition of low-paid, migrant African labourers in the neighbourhood of Durban, which showed a high prevalence of signs of malnutrition among these labourers, associated with poor diets and ignorance of food values. Two further groups were investigated, one consisting of African men in an iron manufacturing firm, and the other of Indian men at a foundry and engineering works. Both groups were slightly better paid than the workers in the previous study, receiving £4 7s. 0d. and £3 14s. 0d. respectively per week, compared with a mean of £2 19s. 11d. Otherwise conditions were not very different, as far as the African workers were concerned; they had nearly all migrated from rural areas and the majority were living away from their families. The percentage living away was, however, 65, compared with 95 in the low-paid groups, and the higher-paid workers had also the advantage with respect to attendance at school.

The Indian workers were of urban origin and were nearly all living with their wives and families.

Mild signs of malnutrition, with ignorance of food values, were observed in both the better-paid groups. The Africans showed the usual reluctance to patronize the works canteen. The higher rates of pay were, however, definitely associated with a rather better state of nutrition and the consumption of somewhat more satisfactory diets. The author concludes that "the higher wage received by these men was in fact the main factor accounting for their better diet and nutritional state. It is apparently not true that 'if African workers are paid higher wages, they will not spend more on food'. On the contrary, it is likely that, as might have been expected, wage increases will appreciably improve the nutritional state of workers".

The author discusses the need for educating workers in better habits of diet

and draws attention to the lack of health educators in South Africa. He comments that " elsewhere, health educators have achieved professional status. In South Africa, where . . . ignorance is a close rival to, if it does not actually exceed, poverty as a cause of disease, there is paradoxically little appreciation of the need for such personnel, whether in industry, in hospitals, or in neighbourhood health services ". With respect to the development of canteen feeding along more satisfactory lines, there were unquestionable difficulties and obstacles which did not, however, lessen the need for it. Canteen feeding could be of considerable educational value. " Particularly if men learn, not only what they themselves should eat, but also what women and children should eat, it is likely that they will effect changes in the family diet. Canteen feeding, together with health education, may appreciably alter food practices in the home. Workers who learn to eat and relish new dishes may introduce them into their own homes." *W. R. Aykroyd*

MAZUMDAR, N. N. **Incidence of Protein Malnutrition and other Nutritional Deficiencies among the Pre-School Children in West Bengal.** *Alumni Ass. Bull.* Calcutta. 1960, Sept., v. 9, No. 16, 16–22.

The author examined 2,818 children between the ages of 1 and 5 living in various urban and rural areas in West Bengal, and belonging to the poorer classes. The main food of the children was rice, with " pulse water " and vegetables, the potato being the vegetable most commonly eaten. Except in one industrial area they received no meat, because of the prohibitive price. Milk was likewise rarely consumed, again because of its high cost.

The incidence of " certain signs of protein malnutrition ", " kwashiorkor ", " marasmus " and " vitamin deficiency " among the children is recorded, but insufficient information is given about the clinical significance of these terms. From the data presented, it appears that from 3 to 7% of the children showed clinical signs of under-nutrition and malnutrition. A growth rate which was retarded in comparison with American standards was characteristic of the group as a whole. *W. R. Aykroyd*

JELLIFFE, D. B. & JELLIFFE, E. F. Patricia. **The Nutritional Status of Haitian Children. (Report of a Field Survey.)** *Acta Tropica.* Basle. 1961, v. 18, No. 1, 1–45, 3 figs. [36 refs.]

This report includes an interesting account of the geography, social history, and economics which form the ecological background of malnutrition of Haiti. 85–90% of the population (3·5 million approximately) are peasants, and primitive subsistence agriculture exaggerates the grave problem of sustaining an expanding population on shrinking land resources.

A total of 2,343 children were examined: 575 infants under 1 year, 273 children aged 3–6 years, 173 aged 6–12 years, and 1,322 pre-school-children aged 1–3 years. An account of findings in the 1,323 pre-school-children with the methods of examination and nutritional assessment has already been published [this *Bulletin*, 1961, v. 58, 244]. This report amplifies this previously published paper giving detailed accounts of methods of survey and clinical examination, and descriptions of food customs and feeding habits.

The findings are generally typical of a child population suffering from protein-calorie malnutrition.

The detailed description of methods employed in this survey, and particularly the assessment of their use after experience in the field, should interest those planning clinical surveys of this kind. *T. P. Eddy*

MOODIE, Aileen. **Kwashiorkor in Cape Town: the Background of Patients and their Progress after Discharge.** *J. Pediatrics.* St. Louis. 1961, Mar., v. 58, No. 3, 392–403, 4 figs. [41 refs.]

This paper is based on a full medical social study of 150 children (119 Cape Coloured, 25 African, 5 Asian, 1 European). A short duration of breast feeding (67 completely weaned by 6 months) was common and often attributed by the mother to "no milk". Diarrhoea, gastroenteritis and also measles were precipitating factors in many instances. At least 40% of the mothers were engaged in some work outside the home and this may have been a frequent cause of the failure of their milk supply. Poor nutrition, fatigue and anxiety in the mothers may also appear important. The majority of families (82%) appeared to live below an arbitrary poverty line. Unemployment was common among the fathers. The general picture presented suggests that in Cape Town primary poverty is the most important cause of the disease, though maternal ignorance and incompetence are certainly contributory factors.

11 of the children died and 10 relapsed but the great majority, who were observed from 3 to 18 months, gained weight continuously during this period. In the minority who failed to thrive there was usually a "dreary story of intercurrent infection, poverty, unemployment, illegitimacy, nonsupport by fathers, and marital disruption". The satisfactory response of the majority to treatment may be due to the fact that the disease marks the culmination of a series of stresses occurring at a critical stage of life [this *Bulletin*, 1960, v. 57, 513, 1203]. Once the crisis has been overcome, then the child may be able to develop.

The basic remedy for the disease in Cape Town must be economic and there is a "whole gamut of social disorganization [which] needs to be met".

R. Passmore

FOY, H., KONDI, Athena & MACDOUGALL, Lorna. **Pure Red-Cell Aplasia in Marasmus and Kwashiorkor treated with Riboflavine.** *Brit. Med. J.* 1961, Apr. 1, 937–41. [28 refs.]

In 1953 two of the authors treated an African adult with riboflavine for pure red cell aplasia, and obtained a significant reticulocyte response and complete recovery (*J. Path. Bact.*, 1953, v. 65, 559). The present authors met the same problem in kwashiorkor.

During the treatment of 23 children with marasmus or kwashiorkor in Nairobi, red cell aplasia was found to occur in 9, of whom 5 were fully investigated. Besides the typical signs of malnutrition, all the infants had diarrhoea, and had received either tetracycline or penicillin and streptomycin during the first week. 2 also received mepacrine. 2 developed measles in hospital, and one was admitted with miliary tuberculosis for which isoniazid was used. Various

other infections were appropriately treated. All the infants received "casilan", skimmed milk, and vegetable oil, and oral iron. At varying intervals from the time of admission (72, 83, 27, 14, and 32 days) it was found by marrow puncture that red cell precursors were unusually scanty, constituting from 0 to 9% of all nucleated cells, while other marrow elements were not affected. Riboflavine was then given orally or intramuscularly in doses of 3 to 5 mgm. daily, and in every case the red cell precursors were found to have risen to normal numbers in the marrow after about a week; and this was followed by a rise of Hb in the blood. In one child there was a relapse to aplasia, but this responded to a second course of riboflavine.

The two notable events—the occurrence of red cell aplasia in malnutrition, and its response to riboflavine—are not explained, but are probably connected. Mepacrine is an antagonist of riboflavine, but had not been given in every case. The other drugs used were not thought to be connected with the aplasia. A "recovery syndrome" has been described in malnutrition, developing 2 to 3 weeks after the start of treatment, and perhaps associated with "dysadrenocorticism", and the relation of riboflavine to this state is documented. It is suggested that the present patients had low stores of riboflavine, that effective treatment involving a high protein intake increased the utilization of the vitamin, and that the erythrocyte precursors in the marrow were consequently deprived of it. How frequently these events occur in malnutrition is not known, but in 2 treated children who died after leaving hospital the authors found the marrow to be aplastic. *Alan B. Raper*

ARROYAVE, G., WILSON, Dorothy, MÉNDEZ, J., BÉHAR, M. & SCRIMSHAW, N. S. **Serum and Liver Vitamin A and Lipids in Children with Severe Protein Malnutrition.** *Amer. J. Clin. Nutrition.* 1961, Mar–Apr., v. 9, No. 2, 180–85. [18 refs.]

In 7 children in Guatemala admitted with kwashiorkor, the levels of serum cholesterol and phospholipids were low, but rose during therapy. The level of total lipids in the serum also rose in response to treatment in 4 patients. There were irregular increases in serum vitamin A and in serum carotene. It is suggested that in kwashiorkor there is an impairment in lipid transport in the blood, and that this may be secondary to a failure of synthesis of the carrier proteins. *R. Passmore*

CASTELLANOS, H. & ARROYAVE, G. **Role of the Adrenal Cortical System in the Response of Children to Severe Protein Malnutrition.** *Amer. J. Clin. Nutrition.* 1961, Mar.–Apr., v. 9, No. 2, 186–95, 1 fig. [22 refs.]

6 children in Guatemala with oedema and low serum protein levels, typical of kwashiorkor, were compared with 5 marasmic children without oedema and with normal levels of serum proteins. Urinary excretion of 17-hydroxysteroids was significantly lower in the kwashiorkor group, but excretion of 17-ketosteroids did not differ in the two groups. Rats on a low protein diet given cortisone showed a marked increase in serum albumin and liver protein, but a decrease in liver fat. The child with marasmus is stated to resemble the protein-deficient rat after treatment with cortisone. *R. Passmore*

ARROYAVE, G. & WILSON, Dorothy. **Urinary Excretion of Creatinine of Children under Different Nutritional Conditions.** *Amer. J. Clin. Nutrition.* 1961, Mar.–Apr., v. 9, No. 2, 170–75, 3 figs. [15 refs.]

Urinary excretion rates of creatinine, expressed as mgm./cm. height/24 hours, in a group of 23 upper-class children in Guatemala City, were similar to those of healthy North American children. The rates were lower in 8 children from poor homes in rural areas. 22 children with kwashiorkor also had low rates, which were raised on recovery. These results are consistent with the hypothesis that creatinine excretion rates in children are a useful measure of muscle mass [this *Bulletin*, 1959, v. 56, 1050]. *R. Passmore*

ARROYAVE, G., WILSON, Dorothy, BÉHAR, M. & SCRIMSHAW, N. S. **Serum and Urinary Creatinine in Children with Severe Protein Malnutrition.** *Amer. J. Clin. Nutrition.* 1961, Mar.–Apr., v. 9, No. 2, 176–9. [10 refs.]

In 9 children with kwashiorkor, rates of urinary excretion of creatinine were very low, and serum levels were also reduced. Endogenous creatinine clearances were very reduced on admission, but increased rapidly with treatment. The very low rates of urinary excretion of creatinine in the acute phase of the disease suggests that at this stage, they are not reliable for estimation of muscle mass. *R. Passmore*

SCRIMSHAW, N. S., BÉHAR, M., WILSON, Dorothy, VITERI, F., ARROYAVE, G. & BRESSANI, R. **All-Vegetable Protein Mixtures for Human Feeding. V. Clinical Trials with INCAP Mixtures 8 and 9 and with Corn and Beans.** *Amer. J. Clin. Nutrition.* 1961, Mar.–Apr., v. 9, No. 2, 196–205. [15 refs.]

This paper records clinical trials of two vegetable mixtures, each based on cornflour and supplemented with either sesame flour or sorghum. To both 3% torula yeast and 3% leaf mould protein were added and each contained over 20% protein. It was demonstrated that on both mixtures nitrogen retention was promoted. The mixtures were acceptable to the children and caused no gastro-intestinal disturbances. Each caused marked clinical improvement in children with kwashiorkor. Both mixtures are recommended for the supplementary feeding of infants and young children, in areas where protein of animal origin is not readily available. *R. Passmore*

WILSON, Dorothy; BRESSANI, R.; SCRIMSHAW, N. S.; GANDRA, Y. R. **Infection and Nutritional Status. I. The Effect of Chicken Pox on Nitrogen Metabolism in Children** [WILSON, BRESSANI & SCRIMSHAW]. *Amer. J. Clin. Nutrition.* 1961, Mar.–Apr., v. 9, No. 2, 154–8, 1 fig. [17 refs.] **II. Effect of Mild Virus Infection induced by 17-D Yellow Fever Vaccine on Nitrogen Metabolism in Children** [GANDRA & SCRIMSHAW]. *Ibid.*, 159–63. [11 refs.]

I. "Nitrogen balance data were obtained for several three-day periods in each of six children with chicken pox. In all the children some degree of reduction in nitrogen retention was noted. In three of them, this occurred in the

period immediately following the appearance of the exanthem, and in two, it was delayed for several more days. In the sixth child, a decrease occurred during the prodromal period. In two of the children the adverse effect lasted for as long as two weeks. Since the infection did not appear to influence nitrogen absorption, an increase in urinary nitrogen was obviously taking place. This was confirmed by direct measurement of urinary nitrogen. Despite efforts to maintain a constant dietary intake, the children consumed less food during the acute phase of infection. The results help explain the association between an epidemic of an acute infection and the subsequent appearance of an increased number of cases of kwashiorkor in children already suffering from underlying protein malnutrition."

II. "Eight boys and one girl, ranging from four to eleven years of age, and from 11·7 to 21·1 kg. in weight, were inoculated with yellow fever vaccine. Two to four three-day periods in which nitrogen balance was determined preceded and followed the vaccination. The basal diet contained 2·5 gm. of protein and 100 calories/kg. of body weight. Body temperature was measured every four hours throughout all periods and no fever developed in any of the children. In eight of the nine children, nitrogen retention decreased significantly although neither absorption nor intake were significantly affected. It is possible that the inoculation did not take in the child who showed no change in nitrogen metabolism. In the eight children showing a response, the drop in nitrogen retention averaged 30 per cent of the nitrogen intake and 35 per cent of the nitrogen absorbed. The decreased retention was due almost entirely to increased nitrogen excretion in the urine."

HAEMATOLOGY

GILLES, H. M. & TAYLOR, B. G. **The Existence of the Glucose-6-Phosphate Dehydrogenase Deficiency Trait in Nigeria and its Clinical Implications.** *Ann. Trop. Med. & Parasit.* 1961, Apr., v. 55, No. 1, 64–9. [24 refs.]

The antimalarial drugs primaquine, pamaquin and pentaquine, which are all 8-aminoquinolines, as well as other drugs, among them aniline derivatives and Furadantin, cause haemolysis in persons with glucose-6-phosphate dehydrogenase deficiency. The present article reports on the incidence of this inherited abnormality in Nigeria.

1,726 persons were examined from 6 different tribes and the overall incidence of the trait was found to be 19·8%. This makes it likely that some at least of the cases of haemoglobinuria occurring in adults at Ibadan are drug-induced haemolytic anaemias and not blackwater fever [this *Bulletin*, 1961, v. 58, 248]. 6 such cases were in fact discovered.

The high frequency of the trait has also a bearing on the development of haemolytic anaemia in the course of sulphone treatment of leprosy.

H. Lehmann

BAKER, S. J., JACOB, E., RAJAN, K. T. & GAULT, E. W. **Hereditary Haemolytic Anaemia associated with Elliptocytosis: a Study of Three Families.** *Brit. J. Haematol.* Oxford. 1961, Apr., v. 7, No. 2, 210–22, 21 figs. (11 on 2 pls.). [27 refs.]

BEAVEN, G. H., ELLIS, M. J. & WHITE, J. C. **Studies on Human Foetal Haemoglobin. III. The Hereditary Haemoglobinopathies and Thalassaemias.** *Brit. J. Haematol.* Oxford. 1961, Apr., v. 7, No. 2, 169–86, 9 figs. [Numerous refs.]

ZARAFONETIS, C. J. D., JOSEPH, Rosaline R., MCMASTER, J. D. & KALAS, J. P. **Osmolarity of Gastric Secretions in Sicklemic Individuals.** *J. Lab. & Clin. Med.* 1961, Apr., v. 57, No. 4, 600–603. [12 refs.]

In contrast with the decreased osmolarity of the urine in sickling subjects [this *Bulletin*, 1960, v. 57, 1304], no osmolarity defect (determined by freezing point after "Histalog" stimulation) was found in the gastric juice of 10 subjects with sickle-cell anaemia, 13 with the sickling trait, and 2 with haemoglobin S/C disease. *Alan B. Raper*

MCCORMICK, W. F. **Abnormal Hemoglobins. II. The Pathology of Sickle Cell Trait.** *Amer. J. Med. Sci.* 1961, Mar., v. 241, No. 3, 329–35, 1 fig. [26 refs.]

In a series of 120 autopsies on subjects with the sickle-cell trait, diagnosis was made by examining the heart blood, and other forms of haemoglobinopathy were excluded by electrophoretic findings and the absence of splenomegaly and siderofibrotic nodules.

Sickling of the red cells was present in histological specimens in all cases; in 15 subjects it was massive, but there were no infarcts. But in 22 subjects there were infarcts for which no other cause than the sickling was apparent. (Only 1% of non-sickling controls had unexplained infarcts.) In the 22 sickling subjects, infarcts occurred in the spleen (11), brain, pituitary, adrenal, kidney, gut (2 each), lung, liver, prostate (1 each).

Death was thought to be due to the trait in 5 patients, aged 2½ months to 32 years, and sickling was thought to have contributed to death in a further 10 instances. The paper emphasizes the anoxic hazards to sicklers of such conditions as heart failure, shock, respiratory infection, and alcoholic excess. [A more critical evaluation of massive sickling in autopsy material, in relation to agonal or post-mortem events, would have been welcome.]

[For part I see this *Bulletin*, 1961, v. 58, 119.] *Alan B. Raper*

WIDEN, A. L. & CARDON, L. *Salmonella typhimurium* **Osteomyelitis with Sickle Cell-Hemoglobin C Disease: a Review and Case Report.** *Ann. Intern. Med.* 1961, Mar., v. 54, No. 3, 510–21, 2 figs. [39 refs.]

The association between sickling disease and *Salmonella* osteitis is well known, and this paper adds another case, that of a Negro girl aged 16 who

suffered from haemoglobin S/C disease. Two clinical points are made: when *Salmonella* osteitis is found, the haemoglobin should be examined, even if there is no anaemia; and the common complaint of bone pain in sickle-cell anaemia and its variants should be assessed with the possibility of bone infection in mind.

A table of 46 reported patients with haemoglobinopathy and osteitis is given, though not all cases were adequately proved; and the table does not include the 65 patients reported by VAN OYE [this *Bulletin*, 1960, v. 57, 1305].

Alan B. Raper

LEHMANN, H. & SHARIH, A. **Tris Buffer for differentiation between Haemoglobins C and E and Separation of Haemoglobins S from F and 'Lepore' from A.** *J. Clin. Path.* 1961, Mar., v. 14, No. 2, 200–201, 3 figs.

TRIS buffer, originally modified for the sharper definition of Hb A_2 [CRADOCK-WATSON *et al.*, *J. Clin. Path.*, 1959, v. 12, 372; this *Bulletin*, 1959, v. 56 (1272)] has certain other advantages.

(a) In TRIS, Hb E moves more slowly than Hb C—the reverse of the result in barbiturate buffer; thus the use of both buffers, together with a control such as Hb AC, will assist in identification.

(b) If Hb S is added to samples containing Hb C or Hb E, the Hb S will separate from either of the other haemoglobins in barbiturate buffer, but not from Hb C in TRIS.

(c) In TRIS, Hb F will separate from Hb S (*e.g.*, in cases of sickle-cell anaemia).

(d) In TRIS, Lepore haemoglobin will show just visible separation, behind Hb A.

[The formula for the buffer is:—

Trishydroxymethylaminomethane (TRIS)	50·4 gm.
Ethylenediaminetetraacetic acid (EDTA)	5·0 gm.
Boric acid	3·8 gm.
Water	1000 ml.]

Alan B. Raper

VENOMS AND ANTIVENENES

BENYAJATI, C., KEOPLUNG, M. & SRIBHIBHADH, R. **Experimental and Clinical Studies on Glucocorticoids in Cobra Envenomation.** *J. Trop. Med. & Hyg.* 1961, Feb., v. 64, No. 2, 46–9.

The authors noticed that when patients bitten by cobras were treated with cortisone to alleviate serum sickness caused by administration of antivenene, the neurotoxic signs and symptoms rapidly disappeared. They therefore studied the effects of glucocorticoids on dogs which had been given lethal intramuscular doses of cobra venom.

A control group of 8 dogs showed pain and swelling at the site of injection, salivation, ptosis, drowsiness, slow respiration and progressive limitation of movement; 7 of them died.

A group of 7 dogs was then given 25 mgm. of prednisolone succinate intravenously immediately after the venom and subsequently every 4 hours until toxic signs had subsided. After a period of mild neurotoxicity, 5 of the dogs recovered; of the 2 which died, 1 was shown post mortem to have an obstructed airway.

Another group was given the first dose of prednisolone 2 hours after the venom and 5 of 6 recovered. In a further group 4 hours elapsed before prednisolone was given; by this time neurotoxic signs were established but nevertheless 4 of 5 animals recovered.

After these encouraging results, 6 patients with cobra bite admitted to Chulalongkorn Hospital, Thailand, were treated with glucocorticoids and their histories are given in detail. The first 5 patients had received antivenene in insufficient dosage, and had become critically ill. 100 mgm. of hydrocortisone in 500 ml. of 10% dextrose were given to 4 patients by intravenous drip. They rapidly improved and were discharged on the following day. Another patient, cyanosed and semi-comatose on admission, was put into a respirator and 75 mgm. of prednisolone succinate followed by 500 ml. of 10% dextrose were given intravenously. The patient was conscious in an hour, respiration returned to normal in 6 hours and she was discharged on the third day.

The sixth patient had received no antivenene and 5 hours after being bitten, had become drowsy and showed ptosis, salivation, slurred speech and dysphagia. He was given an intravenous drip of hydrocortisone; symptoms subsided within an hour, he was normal in 3 hours and was discharged next day.

There were no complications or side effects. The recommended treatment for cobra bite is, therefore, the early intravenous injection of a large dose of glucocorticoid hormone, maintenance of a clear airway and artificial respiration if necessary. *L. G. Goodwin*

DOERY, Hazel M. & PEARSON, Joan E. **Haemolysins in Venoms of Australian Snakes. Observations on the Haemolysins of the Venoms of Some Australian Snakes and the Separation of Phospholipase A from the Venom of *Pseudechis porphyriacus*.** *Biochem. J.* 1961, Apr., v. 78, No. 4, 820–27, 6 figs. & 1 chart. [19 refs.]

YANG, Chen-Chung & CHANG, Chun-Chang. **Biochemical Studies on the Snake Venoms. VI. On the Ophio-L-Amino Acid Oxidase Activity of Formosan Snake Venoms.** *J. Formosan Med. Ass.* 1960, Sept. 28, v. 59, No. 9, 961–70, 5 figs. [11 refs.]

TOXOPLASMOSIS

BEATTIE, C. P. **Toxoplasmosis.** *Practitioner*. 1961, May, v. 186, 651–4. [25 refs.]

A review.

WENDE, Nancy M. & DIENST, R. B. **Endemic Toxoplasmosis in Isolated Swine and Cattle Herds and its Relationship to a Human Population.** *Proc. Soc. Exper. Biol. & Med.* 1961, Feb., v. 106. No. 2, 400–401.

The authors studied 703 patients in a training school for mental defectives in Gracewood, Georgia, U.S.A. The inmates lived in 12 cottages which were self-contained, but food was prepared in a central kitchen, milk was obtained from outside and there was a central water supply. In 2 of the cottages, 51% of 86 persons had positive toxoplasmin skin tests, compared with 15·4% of 617 persons in the other cottages. These 2 cottages housed the patients who assisted in farm work.

Methylene blue dye tests made on 2 large animal herds revealed positive tests at 1 in 16 in 33 of 48 pigs tested and 20 of 24 cattle. No unusual disease had occurred in the animals in the previous 9 years. The pigs had been kept for 12 years in a pasture near the slaughterhouse and the cattle were kept there until 1957 when they were removed to new pastures 5 miles away. All garbage used as pig food was heated to 212°F. for 30 minutes before it was given. *Toxoplasma gondii* was found in the brain tissue of 5 of 14 randomly selected pigs by mouse inoculation.

The high incidence in herbivorous domestic herds indicated a circumscribed area of endemic infection and suggested that transmission from animal to animal had occurred easily by means other than consumption of infected meat: the high incidence in patients from 2 cottages having the same source of meat as those in the other cottages also excluded consumption of infected meat as a primary source of the human infections. All the factors suggested that (a) the strain of *T. gondii* isolated was of low virulence, (b) the high human incidence was related to association with infected farm animals.

H. J. O'D. Burke-Gaffney

VARELA, G., ROCH, E. & CURBELO, A. Exploración serológica de toxoplasmosis. Estudio de 6,569 sueros sanguíneos. **[Serological Survey of Toxoplasmosis. Study of 6,569 Sera]** *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1959, Sept., v. 19, No. 3, 259–63. [12 refs.]

The authors applied the dye test to 6,569 samples of sera in dilutions from 1 in 16 to 1 in 280. Positive results obtained with sera from various groups were as follows: 28·5% in 2,341 random samples from persons in Mexico, up to 48·5% in 2,335 suspected cases of toxoplasmosis and 53·6% in 181 mental patients in Mexico, up to 40·6% in 822 persons from Colombia, and 32·4% in

340 persons from Cuba. The reactions were positive also in 36·3% of sera from rats and in 54% from cats in Mexico. Detailed results are given in 5 tables. *C. A. Hoare*

VAN DER GULDEN, W. J. I. & FOLKERS, C. *Toxoplasma gondii* bij biggen in Nederland. [*Toxoplasma gondii* **in Piglets in the Netherlands**] *Tijdschr. v. Diergeneesk.* 1961, Apr. 15, v. 86, No. 8, 542–6, 3 figs. [12 refs.]

The English summary appended to the paper is as follows:—

"At the histological examination of the lungs of piglets, which were suffering from swine fever, *Toxoplasma*-like parasites were observed.

"Then *Toxosplasma gondii* has been isolated for the first time in the Netherlands from piglets."

VAN DER VOUDEN, M. *Toxoplasma gondii*, **a Possible Cause of Stillbirth in Cattle.** *Tijdschr. v. Diergeneesk.* 1961, Apr. 15, v. 86, No. 8, 554–5.

A disturbingly large proportion of abortions or stillbirths in a small herd of pedigree cows in an area in New Zealand between 1957 and 1960 (the author writes from Peroa) suggested an unusual situation, since autopsy and bacteriological examinations of one of them were completely negative. When 4 of 28 cows lost their calves almost at full term, in 1960, the calves were neverthless born alive, though they died in a few hours. 3 of them were examined after death and no lesions or pathogenic organisms were found in routine examinations. However, histological examination revealed small foci indistinguishable from those of *Toxoplasma gondii* in the brain of one calf and serum from one of the 4 cows was positive by the dye test.

The herd was grazed with ewes, in which abortion from *T. gondii* infection is fairly common in New Zealand, and the author speculates as to whether this might be related to abortion and stillbirth in cattle.

H. J. O'D. Burke-Gaffney

FISH, N. A. **Toxoplasmosis Diagnosis by Serological and Cultural Methods.** *Canadian J. Pub. Health.* 1961, Mar., v. 52, No. 3, 107–10, 3 figs.

"Antibodies for Toxoplasma gondii were demonstrated by the Sabin-Feldman dye test in sheep and mink sera collected from animals suspected of toxoplasmosis. Toxoplasma gondii organisms were recovered by animal inoculation from the brain tissue of suspected mink and placental membranes of aborted sheep. The recovery of the organisms from serologically positive animals substantiates the reliability of the dye test as a diagnostic aid."

GANGI, D. P. & MANWELL, R. D. **Some Aspects of the Cytochemical Anatomy of** *Toxoplasma gondii*. *J. Parasitology.* 1961, Apr., v. 47, No. 2, 291–6, 10 figs. on pl. [24 refs.]

WOODWORTH, H. C. & WEINMAN II, D. **Studies on the Toxin of Toxoplasma (Toxotoxin).** *J. Infect. Dis.* 1960, Nov.–Dec., v. 107, No. 3, 318–24.

The toxic substance produced *in vivo* by *Toxoplasma* has been described previously by WEINMAN and KLATCHKO (*Yale J. Biol. & Med.*, 1950, v. 22, 323). This paper describes the production of the toxin from peritoneal fluid of mice infected with *Toxoplasma* and its potentiation with heat treatment; it also describes the biological assay of the toxin, making use of its ability to produce clonic convulsions in mice. The MLD of unpotentiated extract is 0·1–0·5 ml. and the average potentiation on heating for 30 minutes at 56°C. is 6-fold.

The activity was present in a fraction precipitated by ammonium sulphate at the same concentration as globulin, and was also produced in the peritoneal exudate of infected rats treated with cortisone but not in the amniotic and allantoic fluids of infected embryonated eggs. *W. E. Ormerod*

PIEKARSKI, G., SAATHOFF, M. & SCHÄFER, E. Die Komplementbindungsreaktion im Plattentest in ihrer Anwendung zum Nachweis von Toxoplasma-Antikörpern. [**The Plate Method of the Complement-Fixing Test and its Application for the Determination of** *Toxoplasma* **Antibodies**] *Zent. f. Bakt.* I. Abt. Orig. 1961, v. 181, No. 3, 407–15, 1 fig. [31 refs.]

REUSS, K. Untersuchungen zur Hämagglutinationsreaktion auf Toxoplasmose nach Jacobs und Lunde. [**Studies on the Haemagglutination Reaction for Toxoplasmosis of Jacobs and Lunde**] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1961, Feb., v. 121, No. 1, 75–90. [18 refs.]

In a careful study of 256 sera, the haemagglutination test for toxoplasmosis described by JACOBS and LUNDE [this *Bulletin*, 1957, v. 54, 1463, 1464] was compared with the dye and complement-fixation tests. Good overall correlation was found with both tests. There were no false positive results with the haemagglutination test, which, however, was not quite as sensitive as the dye test. Good correlation was not found with the titres of the positive sera yielded by the different tests, and this difference between the haemagglutination test and the older tests is discussed from the technical viewpoint. Useful qualitatively, as the new test is at present, until a better quantitative parallelism can be achieved the authors do not recommend it for routine use.

I. A. B. Cathie

BURFORD, F. & SUTLIFF, W. D. **Toxoplasmosis Case-Finding.** *Arch. Intern. Med.* 1960, Dec., v. 106, No. 6, 835–41, 2 figs. [10 refs.]

From patients in the wards of a general medical Veterans Hospital, 192 were selected as possible cases of toxoplasmosis. Clinical features favouring selection included involvement of the reticulo-endothelial system, the lungs, heart, musculo-skeletal system, brain, eye, endocrine system or skin with acute, sub-acute or chronic diseases.

In the methods section of this paper, there is a description of the technique of the dye test for toxoplasmosis and of a method for recovering *Toxoplasma* from laboratory animals inoculated with tissue from suspected lesions. It appears that the dye test was done on each of the 192 patients but the number in which attempts were made to recover the causal organism is not stated.

The dye test was positive in 96, *i.e.* 50% of the 192 patients, whereas in a sample of the general population of the region it had been found in another survey to be positive in 30% of those tested. Not surprisingly, among the hospital patients the dye test was found to be positive in a high proportion of those suffering from diseases of the uveal tract. 7·8% of the hospital patients had a positive dye test at titres of 1 in 256 to 1 in 1,000 whereas only 1·7% of the general population tested had similar titres. Among those with these high titres there were patients with atypical choroiditis or uveitis, 2 patients with lymphadenopathy of the inguinal and pulmonary hilar nodes respectively (these had initially been diagnosed as lymphopathia venereum and sarcoidosis respectively), and others with chronic senile mental disturbances, thyrotoxicosis, myocarditis and acute pharyngitis. There were also patients with diseases other than toxoplasmosis who nevertheless had high dye test titres and it is suggested that such patients had a latent toxoplasmic infection complicating their primary disease.

Four detailed case histories are given. *A. W. Woodruff*

DERMATOLOGY AND FUNGUS DISEASES

Ockner, R. K. & Schmid, R. **Acquired Porphyria in Man and Rat due to Hexachlorobenzene Intoxication.** [Correspondence.] *Nature*. 1961, Feb. 11, v. 189, 499, 1 fig.

Rats were given 0·2% hexachlorobenzene in the diet because of the possibility that the outbreak of cutaneous porphyria, which affected groups of 3 genetically distinct populations in Turkey in 1956, had been related to ingestion of wheat treated with a fungicide which contained this compound [this *Bulletin*, 1961, v. 58, 130, 131]. Of 33 rats, 13 died within 1 month, showing terminal tremor, weakness, ataxia and paralysis without disturbance of porphyrin metabolism. Urinary excretion of porphyrins and porphyrin precursors in the remaining 20 began to increase in 2–8 weeks. It decreased to normal 1 week after the experimental diet was stopped and increased again irreversibly after the hexachlorobenzene was again given and discontinued. These animals died showing the above neurological signs.

The figures in brackets below are normal values. Peak urinary excretory values per 24 hours were: δ-amino-laevulinic acid 1·4 mgm. (0·06); porphobilinogen 16·96 mgm. (0·01); uroporphyrin 0·36 mgm. (trace); coproporphyrin 0·211 mgm. (0·016). From 200 ml. urine 55 mgm. crystalline porphobilinogen were obtained. Enlarged livers showed cellular degeneration and the values per 100 gm. wet tissue were: uroporphyrin 0·4–0·5 mgm. (trace); copro- and

proto-porphyrin 0·05–0·15 mgm. (0·01–0·02). Porphobilinogen was demonstrable in aqueous extracts of liver tissue. Liver catalase was not significantly reduced. Faecal excretion of copro- and proto-porphyrin was increased. Blood examinations were normal. Intense red fluorescence was observed in the cortex of long bones, but not in marrow. *M. Patricia Fitzsimons*

ABERNATHY, R. S. & HEINER, D. C. **Precipitation Reactions in Agar in North American Blastomycosis.** *J. Lab. & Clin. Med.* 1961, Apr., v. 57, No. 4, 604–11. [18 refs.]

The diagnosis of North American blastomycosis is not always easy by either histological or cultural techniques. Skin tests are often negative during active infection and complement-fixation reactions are negative in up to 50% of people with established disease. It is known that specific antibodies for *Histoplasma capsulatum* can be demonstrated by gel diffusion techniques in agar; in addition, an antigen common to *H. capsulatum*, *Blastomyces dermatitidis* and *Coccidioides immitis* can be so demonstrated.

The authors studied sera from 22 patients with confirmed North American blastomycosis, from 51 healthy people, from 39 patients with other mycosis and from 144 patients suspected of having a mycosis. Reactions with antigens from fungi other than *B. dermatitidis* were also tested on these sera and the sera of 1,616 additional patients suspected of having a mycosis.

Antigens were prepared from the mycelial phases of *B. dermatitidis*, *H. capsulatum* and *C. immitis* and precipitations in agar were carried out by a modified Ouchterlony technique.

Antibodies were detected in the serum of persons with proved blastomycosis with the same frequency by gel diffusion as by complement-fixation tests (*i.e.* in 64–67% of cases); the correlation between the two techniques was generally good but 2 patients gave negative precipitin and positive complement-fixation reactions and 2 gave the opposite, suggesting that better diagnoses are obtained by carrying out both tests on all suspects. A few people, initially positive, gave negative precipitin reactions some weeks after treatment with hydroxystilbamidine had begun.

Heterologous antigens from *H. capsulatum* reacted in some cases with antibodies in sera from people with blastomycosis, but in all cases the specific precipitin line of *H. capsulatum* was absent. There were no cross reactions between *C. immitis* antigens and the sera of the 22 proved cases of blastomycosis, but a few non-specific reactions were observed in the other sera. *Blastomyces* antigens gave no precipitin lines with sera from the 51 healthy subjects and lines in only 1 of the 144 patients with suspected mycoses—probably a genuine false positive though the exact diagnosis was uncertain.

This is a simple and easily interpreted test which should become a routine in the diagnosis of North American blastomycosis, particularly when cultural confirmation is lacking. It is essential to be familiar with HEINER'S earlier paper, *Diagnosis of Histoplasmosis using Precipitin Reactions in Agar Gel* [*Bull. Hyg.*, 1959, v. 34, 764]. *Ian G. Murray*

TROPICAL OPHTHALMOLOGY

HILDENBRAND, T. **Trachoma Treatment with a Long-Acting Sulphonamide (Madribon) combined with Eye Ointment (Gantrisin).** *Med. Proc.* Johannesburg. 1961, Mar. 11, v. 7, No. 5, 92–5.

Many cases of trachoma can be cured by an oral sulphonamide or an antibiotic eye ointment. This may be due to the effect upon the virus or because the disease burns itself out when superinfection is controlled.

Hildenbrand found that a percentage of cases among Bantu children in South Africa were not cured by ointment alone. Irregular attendance, reinfection at home and resistance to treatment were adverse factors. He established that a long-acting sulphonamide, which kept up a high blood level, combined with local treatment with an antibiotic ointment produced the best results. The diagnostic criterion was the presence of pannus established by a slit-lamp examination.

Sulphadimethoxine (Madribon) was given daily for 18 days and again after a 7-day interval for 6 days; combined with 4% ophthalmic ointment of sulphafurazole (Gantrisin) applied twice daily for 5 days, repeated after 4 weeks and 8 weeks.

The combined treatment showed a therapeutic response, healed and healing, of 95%; with sulphadimethoxine alone 84% and with sulphafurazole alone 62%.

[It is encouraging to record this therapeutic research and, later, we may be able to evaluate this treatment in comparison with treatment by acetyl sulphamethopyrazine, trials of which are being carried out in Mexico.]

A. McKie Reid

COLLIER, L. H. **Experiments with Trachoma Vaccines. Experimental System using Inclusion Blennorrhoea Virus.** *Lancet.* 1961, Apr. 15, 795–800, 4 figs. [21 refs.]

This paper reports some preliminary experiments on immunization against trachoma made in baboons. Because the G1 strain of trachoma virus (8th to 11th chick embryo passages) either failed to infect these animals or only produced atypical disease on conjunctival infection, a strain LB4 of the closely-related virus of inclusion blennorrhoea [*Bull. Hyg.*, 1959, v. 34, 1060] was used; it induced regularly a severe follicular conjunctivitis in these animals. The vaccine—a living one—was prepared from heavily infected yolk sacs of the 5th chick embryo passage of LB4 suspended in buffered saline and purified by fractional centrifugation; a control antigen was made from uninfected yolk sacs. Challenge of immunity was made by conjunctival inoculation with the same strain. Complete protection was given by 3 doses of vaccine, 2 subcutaneously and 1 intravenously, given at weekly intervals. 3 subcutaneous doses of vaccine provided only partial protection. *S. P. Bedson*

TROPICAL ENVIRONMENTAL CONDITIONS

GROBER, J. **Wärmestauung und Schwülekrankheiten. Entstehung, Verlauf, Behandlung und Verhütung für Arzte und Hygienetechniker.** [Heat Congestion and "Sultriness Diseases". Origin, Course, Treatment and Prevention.]

This book was reviewed on p. 766.

MACPHERSON, R. K. [Compiled by.] **Physiological Responses to Hot Environments. An Account of Work done in Singapore, 1948–1953, at the Royal Naval Tropical Research Unit with an Appendix on Preliminary Work done at the National Hospital for Nervous Diseases, London.** *Med. Res. Council Spec. Rep. Ser. No. 298.* pp. xv + 323, illustrated. 1960. London: H.M. Stationery Office. [35s.]

[This review appears also in *Bull. Hyg.*, 1961, v. 36, August.]

This report gives the results obtained during a 7-year programme of research carried out under the direction of the Royal Naval Personnel Research Committee of the Medical Research Council. The work was begun in 1944 at the National Hospital for Nervous Diseases in London, and was later continued at the Royal Naval Tropical Research Unit in Singapore.

In the London experiments the physiological effects of exposure to high air temperatures on men wearing different types of clothing were examined at different humidities and air speeds, both when the men were working and when they were resting. The subjects of these experiments had been artificially acclimatized by previous exposure to hot conditions in the laboratory, and on the basis of the results of the experiments tentative recommendations were made as to the conditions of warmth that were acceptable in ships at sea in tropical waters.

The results of these early experiments also seemed to show that the Effective Temperature Scale, which had been accepted for use as an index of warmth in HM Ships, was misleading in certain respects, and in consequence a new index, the Predicted Four-hour Sweat Rate (P4SR) was devised for the assessment of hot environments.

From the outset it had been recognized that investigations would have to be made in a tropical climate, and in 1948 the Royal Naval Tropical Research Unit was set up in Singapore. There, similar studies were made. These largely confirmed the earlier findings in London. Although they did not entirely support the criticisms of the Effective Temperature Scale, they did show that the P4SR was an accurate and convenient measure of the severity of indoor environments.

The work at Singapore was extended to compare the relative tolerance to heat of men who had been artificially "maximally acclimatized" in the laboratory and those who had been "naturally acclimatized" by residence in a tropical climate. The stress imposed by radiant heat of long wave-length and by different rates of energy expenditure was also studied. Investigations to determine the upper limits of warmth that should be allowed in ships were extended to determine the upper limits that could be tolerated, and also the

limits of the "comfort zone". Various other problems related to the main lines of research were also examined.

The main body of the report deals with the work carried out in Singapore, and an account of the work done earlier in London is given in an Appendix.

In the introductory chapter the wartime background and the later establishment of the Unit at Singapore are described. Then there are 8 chapters dealing with the various investigations, and at the head of each of these are given the names of those who took part.

The research was directed towards providing information which was required for specific purposes, and in the final chapter Dr. Macpherson discusses the extent to which those requirements were fulfilled. This chapter gives an admirable appraisal of the present state of knowledge on the assessment of environmental heat stress, the desirable upper limits of warmth, and the phenomenon of acclimatization. Concerning the first of these it is remarked that the assessment of the heat load imposed on man by solar radiation is one of the most urgent requirements of applied climatic physiology. Summing up the discussion on upper limits of warmth it is considered that "a knowledge of the physically tolerable levels of warmth is important, and equally so is a knowledge of the levels at which efficiency is likely to decline in the length of an ordinary working period; however it is more important to know, particularly for living quarters, the levels at which thermal comfort is experienced". Finally, it is concluded that the most important work yet to be done on the effects of hot environments on man is "the determination of the fundamental mechanism of acclimatization and the effect of exposure to heat over a period, not of hours or weeks, but of years, or even generations".

The arrangement of the report is excellent. The mass of detailed experimental results is given in a series of 123 tables following the main report, and in 17 tables following the Appendix. Thus all the pertinent statistical information is made available without interruption of the narrative.

This publication is an outstanding contribution to knowledge of climatic physiology. It will be of value not only to physiologists but to all who are concerned with life in hot climates or work in hot industries. All those who took part in this prolonged and exacting research are to be congratulated on the results achieved. Those who read the report will be grateful to Dr. Macpherson for the skill and patience that he has devoted to the arduous task of compilation, and for his clear review of the implications of the findings.

Thomas Bedford

MISCELLANEOUS DISEASES

MARSHALL, A. J. & CHERRY, J. K. T. **Endocrine Dysfunction in a Nakalanga Dwarf.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1961, Mar., v. 55, No. 2, 188–91.

A new clinical syndrome, cachectic infantilism associated with early, continuous, and heavy onchocercal infection, was described from Uganda in 1950

[Raper and Ladkin, this *Bulletin*, 1951, v. 48, 196]. It was subsequently shown to occur in all the main foci of onchocerciasis in Uganda, but not in adjacent areas free from the disease [Raper, *ibid.*, 1958, v. 55, 929]. No post-mortem material had however been studied, and this paper remedies the defect by describing the findings in the pituitary, thyroid, adrenals, and testes of a 30-year-old male patient with the " Nakalanga " disease.

After recovery from an attack of pneumonia, the patient was treated for his onchocerciasis with antrypol and diethylcarbamazine, under cover of prednisolone. Shortly afterwards he developed a pyrexia and died; the cause of death is not stated.

In the pituitary the chromophobe cells had pyknotic nuclei, and acidophil and basophil cells were on the whole few, especially the latter. The thyroid showed moderate simple atrophy. There were mild atrophic changes in the adrenals. [It may be remarked that the above changes are often to be found in malnourished cachectic subjects dying in hospital in Uganda.] The testes, however, were strikingly abnormal; they showed vacuolated Leydig cells free of cholesterol, and no spermatogenesis. There were no microfilariae, and no granulomatous reactions, in these endocrine glands.

The authors believe that the primary affection may be in the hypophysial portal system or the hypothalamus, and suggest that microfilarial products may jeopardize humoral transmission in this region. *Alan B. Raper*

Rapaport, F. T., Millar, J. W. & Ruch, J. **Endotoxic Properties of** *Pseudomonas pseudomallei*. *Arch. Pathology*. 1961, Apr., v. 71, No. 4, 429–36, 3 figs. [22 refs.]

" Aqueous extracts of Ps. pseudomallei contain a heat-stable principle with classical endotoxin activity. Elicitation of the generalized Shwartzman reaction with this endotoxin is associated with bilateral ear haemorrhage, thrombosis, and deposition of fibrinoid.

" The histologic features of skin sites prepared for the local Shwartzman reaction with Ps. pseudomallei endotoxin closely resemble those noted in skin reactions of the delayed type of hypersensitivity."

Brodribb, H. S. & Worssam, A. R. H. **Favism in an Englishwoman.** *Brit. Med. J.* 1961, May 13, 1367–8. [17 refs.]

" A case of favism in an Englishwoman with no known foreign antecedents is reported.

" The genetic abnormality of glucose-6-phosphate dehydrogenase deficiency has been found in the erythrocytes of the patient and members of her family.

" It is suggested that further cases may be occurring unrecognized in Britain, and the diagnosis is discussed."

Sharma, D. N. **Lathyrism: the Old and New Concepts.** *J. Indian Med. Ass.* 1961, Apr. 1, v. 36, No. 7, 299–304. [Numerous refs.]

BHARGAVA, H. S., CHOUBEY, B. S. & CHOUHAN, S. S. **Treatment of Tropical Eosinophilia with Diethylcarbamazine. Single Oral Dose Therapy—a Preliminary Report of 30 Cases.** *J. Ass. Physicians India.* 1961, Mar., v. 9, No. 3, 222–9. [17 refs.]

The authors summarize the literature suggesting that tropical eosinophilia is caused by filarial infection and that the treatment of choice is with diethylcarbamazine.

They had previously treated 2 series of patients with this drug: 21 with oral dosage of 8–10 mgm. per kgm. body weight daily in 3 divided doses for 7 days, and 20 with 2 injections of 6–8 mgm. per kgm. [this *Bulletin*, 1960, v. 57, 953]. They now treated 30 patients with a one dose regime of 15–16 mgm. per kgm. (that is usually 900 mgm.).

The criteria for selection were: (1) absolute eosinophil count of over 3,000 per cmm.; (2) suggestive symptomatology—cough, expectoration, nocturnal exacerbation of cough, and signs [unspecified] in the lungs; (3) exclusion of other conditions; (4) ability to attend for follow-up.

25 of these patients were followed up for at least 3 weeks. All of these obtained complete clinical relief. While about half began to obtain relief within 12 hours, others took a week, and complete relief was not often obtained in less than this period. The eosinophil count did not decrease coincidently with the clinical improvement, and the authors remark that if complete relief is obtained in under a week the eosinophil count and the erythrocyte sedimentation rate do not drop and may even increase. They contrast their 100% symptomatic success with their previous results, 76% with 7-day oral dosage, and 80% [not 60% as stated] with intramuscular dosage.

They noted very few toxic effects. Vomiting occurred in 5 patients 2–3 hours after taking the drug, and 1 could not take it at all by mouth [this patient cannot have been included in this series]. 1 had abdominal pain, and 1 had some giddiness. 4 patients had an exacerbation of symptoms after 12–20 hours which cleared without any additional therapy. *A. C. E. Cole*

PARASITOLOGY: GENERAL

SANTOPADRE, G. & PIERI, G. Indagini sulla diffusione delle parassitosi intestinali tra i bambini dell'età scolare della provincia di Forlì. [**Investigations into the Spread of Intestinal Parasitosis among Children of School Age in Forlì Province**] *Riv. Italiana d'Igiene.* 1960, Sept.–Oct., v. 20, Nos. 9/10, 367–79, 1 map. [11 refs.] English summary.

This province abuts on the Adriatic and its population can be classified into various groups which differ in their prevailing occupations—farming, manufacturing industry or hotel-keeping and allied tourist employment.

The authors examined specimens of faeces from 4,804 schoolchildren [age range not defined exactly] which were obtained either from normal stools or by Graham's "Scotch tape" method. They followed a modification of

Ritchie's enrichment technique and, in addition, submitted 400 of the specimens also to the unmodified test of Ritchie and to the flotation method in a saturated solution of sodium chloride as used by Fülleborn and Willis.

Intestinal parasites were demonstrated in 2,817 or in 58·6% of the subjects examined and the details are analysed in a number of tables. *Entamoeba histolytica* was not found; 729 children had each 2 species of parasite, 197 had 3 and 56 had more than 3 species of parasite. There was no significant difference of incidence in the 2 sexes and the social and economic circumstances of the households from which the children came did not seem to be relevant, but the standard of health education and the opportunities for contact in the schools were significant factors. The authors found a progressive increase in incidence on passing from north to south of the province. They found no evidence of a higher incidence in rural than in urban areas.

J. Cauchi

LAIRD, M. & MEEROVITCH, E. **Parasites from Northern Canada. I. Entozoa of Fort Chimo Eskimos.** *Canadian J. Zool.* 1961, Feb., v. 39, No. 1, 63–7. [13 refs.]

Stool specimens were obtained from 46 Eskimos from Fort Chimo, Ungava Bay, northern Canada. Portions were mixed with 5 ml. of MIFG (merthiolate-iodine-formalin-glycerin) and despatched in plastic tubes to be studied at leisure up to 17 months later. 16 children were examined by the tape technique for pinworm ova.

The most important infection appeared to be *Diphyllobothrium* sp., ova of which were found in 13 (28%); these infections are thought to be derived from the arctic char (*Salvelinus alpinus*), the Canadian Eskimo's most important food fish. No ova of roundworms, hookworms, or other worms were found, nor were pinworm ova, though these have been found in Eskimos by other investigators [this *Bulletin*, 1949, v. 46, 376; 1951, v. 48, 475].

Cysts of intestinal protozoa were found in 21 (46%). These were, however, mainly of *Entamoeba coli*, *Endolimax nana*, and *Chilomastix mesnili*. The only protozoon normally regarded as pathogenic, *Giardia intestinalis*, was found only in children aged 0–9 years; in these it occurred in 33%.

A. C. E. Cole

LAIRD, M. **A Lack of Avian and Mammalian Haematozoa in the Antarctic and Canadian Arctic.** *Canadian J. Zool.* 1961, Apr., v. 39, No. 2, 209–13. [16 refs.]

RAVISSE, P. Présentation d'un parasite découvert dans un frottis de ponction ganglionnaire. [**A Parasite Discovered in a Smear from a Gland Puncture**] *Bull. Soc. Path. Exot.* 1960, Nov.–Dec., v. 53, No. 6, 929–31, 1 fig. on pl.

The English summary appended to the paper is as follows: —

"The author found in a submaxillary ganglion plasmocytes and elements having the appearance of an unidentified extracellular parasite. This parasite does not appear to be a Sporozoa."

HENNIGAR, G. R., VINIJCHAIKUL, K., ROQUE, A. L. & LYONS, H. A. *Pneumocystis carinii* **Pneumonia in an Adult. Report of a case.** *Amer. J. Clin. Path.* 1961, Apr., v. 35, No. 4, 353–64, 8 figs. [29 refs.]

[See this *Bulletin*, 1961, v. 58, 265.]

DÁVALOS MATA, A. Infección latente producida por *Pneumocystis carinii* en conejos de la ciudad de México. [**Latent Infection with** *Pneumocystis carinii* **in Rabbits of Mexico**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1959, Dec., v. 19, No. 4, 357–60, 7 figs. [12 refs.] English summary (2 lines).

There have hitherto been no records of infections with *Pneumocystis* in animals from Mexico. The author examined the lungs of 30 cats, 10 dogs and 15 rabbits and found 2 of the rabbits harbouring this parasite. Cysts with 8 uninucleate bodies were most common, but immature cysts with 1, 2, 4, 6 bodies were also encountered. The parasites apparently produced no harmful effect on the rabbits, whose lungs had a normal appearance. The parasites are depicted in a number of photomicrographs. *C. A. Hoare*

RITCHIE, L. S., LIN, S., MOON, A. P., FRICK, L. P., WILLIAMS, J. E., ASAKURA, S. & HISHINUMA, Y. **The Possible Effects of pH and Specific Gravity on the Ether-Sedimentation Procedure in Concentrating Eggs and Cysts.** *Amer. J. Trop. Med. & Hyg.* 1960, July, v. 9, No. 4, 444–9. [16 refs.]

This paper reports further work by these authors (*Amer. J. Trop. Med. & Hyg.*, 1957, v. 6, 375) to determine the factors which influence the efficiency of the ether-sedimentation method of faecal concentration.

The effect of varying the *p*H alone was investigated by using aqueous solutions buffered at *p*H 4, 7 and 10 as the concentration medium. The effect of reducing specific gravity was observed by adding alcohol to the solutions of varied *p*H values in amounts giving a final concentration of 20%.

The results showed markedly better concentration of *Ascaris* eggs at *p*H 7 and 10 than at *p*H 4 whereas the results with hookworm and *Trichostrongylus* eggs were reversed. *Trichuris* eggs were unaffected by *p*H whereas *Schistosoma japonicum* followed the pattern of *Ascaris*. Protozoal cysts were little affected by *p*H but there was a consistent bias in favour of *p*H 7 for all species. Reduction of specific gravity by addition of alcohol resulted in marked increases in the number of eggs of *Ascaris* and *S. japonicum* with peak efficiency at *p*H 7. The use of alcohol did not increase the yield of protozoa and there was a slight suggestion of decreased efficiency.

The authors themselves realized that a possible criticism of their work was that the chemicals used to change the *p*H and specific gravity may in themselves have affected the results. Another problem in assessing the results is that with investigations of this sort it is difficult to devise exactly standardized procedures and much depends on the individual skill and judgement of the technicians concerned. *W. P. Stamm*

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene.]

GRJEBINE, A. Un nouvel anophèle de Madagascar. [**A New Anopheline from Madagascar**] *Bull. Soc. Path. Exot.* 1960, Nov.–Dec., v. 53, No. 6, 939–42, 1 fig.

LELEUP, N. & ZAGHI, A. A propos de *Anopheles* (*Myzomyia*) *faini* Leleup et de *A. faini* subsp. *van Thieli* Laarman. [*Anopheles faini* **and** *A. faini van Thieli*] *Ann. Soc. Belge de Méd. Trop.* 1960, Dec. 31, v. 40, No. 6, 925–30. [12 refs.] Discussion 930–31.

DÉDUIT, Yolande. Études sur la ponte par autogenèse des Culicides. IV. Données numériques sur l'acte de ponte chez un groupe de femelles fécondées de *Culex pipiens autogenicus* Roubaud; recherche d'effet de groupe. [**Study of Autogenic Oviposition in Mosquitoes. IV. Statistical Data relating to Oviposition in a Group of Fertilized Females of** *Culex pipiens autogenicus*. **Study of the Group Effect**] *C.R. Soc. Biol.* 1960, v. 154, Nos. 8/9, 1617–19.

[See also this *Bulletin*, 1958, v. 55, 1385.]

BROWN, A. W. A. & CARMICHAEL, A. G. **Lysine and Alanine as Mosquito Attractants.** *J. Econom. Entom.* 1961, Apr., v. 54, No. 2, 317–24, 4 figs. [27 refs.]

"L-lysine was found to be an attractant for *Aedes aegypti* (L.) that is present in human blood. L-alanine was also attractive, while L-arginine was slightly attractive. All the other amino acids tested were either not attractive or actually repellent. Nitrogenous bases were either unattractive, *e.g.*, asparagine, ornithine and ammonia, or repellent, *e.g.*, cadaverine and putrescine. Column chromatography showed that the compounds responsible for the attractiveness of 11 different protein hydrolysates, beef blood plasma and human blood plasma were firstly L-lysine, secondly L-alanine, and possibly L-arginine. D-lysine was also attractive. L-lysine was attractive in extreme dilution, *i.e.*, down to 1 p.p.m., and its vapour activated resting mosquitoes. It was attractive also to *Aedes stimulans* (Walker), *Culex pipiens* L., and four strains of *A. aegypti*. Chemical confirmation has been obtained that L-lysine actually distils with water vapour."

FONTAN, R. & FAURAN, P. Sur l'élimination de Guyane Française d'une population d'*Aedes aegypti* résistant au D.D.T. [**Eradication of** *Aedes aegypti* **Resistant to DDT in French Guiana**] *Arch. Inst. Pasteur de la Guyane Française et de l'Inini. Publication No. 458.* 1960, Apr., 14 pp., 1 fig.

By spraying the houses with DDT, *Aedes aegypti* was eliminated from the coastal zone of French Guiana by 1949; by 1950 the last focus of the insect in

the hinterland had been suppressed by the same means [this *Bulletin*, 1954, v. 51, 370]. Because of the presence of yellow fever virus throughout the forest area of the interior, it was of prime importance to prevent the re-establishment of the urban vector. Since 1949, DDT at a dosage of 2 gm./m.^{2} has therefore been sprayed in dwellings throughout the coastal area, and for 9 years no specimen of *Aedes aegypti* was encountered [*ibid.*, 1959, v. 56, 124].

In 1959, however, the authors reported that a strain of *Aedes aegypti* resistant to DDT had become established in the coastal zone [*ibid.*, 1960, v. 57, 657]. In the paper now presented details are given of the measures taken to deal with this situation.

The interior of all dwellings in the infested zone was sprayed with dieldrin at a dosage of 750 mgm./m.^{2}, the preparation used being Actidrine, which contains 50% of pure dieldrin. The zone sprayed had an area of 4,500 km.^{2}, with a population of 21,784 occupying 8,934 houses. All domestic breeding places in the zone were treated with a mixture of petroleum and fuel oil. The houses in the remaining zones were sprayed as before with DDT.

Two months after the completion of this operation, a search of 3,200 dwellings failed to disclose a single specimen of *Aedes aegypti*.

The existence of strains of *Aedes aegypti* resistant to DDT in Surinam and in the Antilles, between which and French Guiana there is frequent communication by sea and air, renders it necessary to continue indefinitely the application of measures to prevent re-invasion.

The authors conclude from the success of the dieldrin campaign that the total eradication of *Aedes aegypti* from the Americas is still a possibility.

G. Covell

FAURAN, P. Note sur la morphologie de *Phlebotomus brachipygus*, *P. campbelli*, *P. carvalhoi*, *P. fariasi*, *P. tuberculatus* (Diptera: Psychodidae), signalés pour la première fois en Guyane. [**Notes on Morphology of** *Phlebotomus brachipygus*, *P. campbelli*, *P. carvalhoi*, *P. fariasi* **and** *P. tuberculatus*, **recorded for the first time in Guiana**] *Arch. Inst. Pasteur de la Guyane Française et de l'Inini. Publication No. 460.* 1960, Aug., 10 pp., 14 figs.

WALDROP, R. H., PEEL, R. & SCHOOF, H. F. **Fly Reduction through Sanitary Improvements. Fly Movement Study shows Benefits of Control Program.** Reprinted from *Modern Sanitation and Building Maintenance.* 1958, Sept., v. 10, No. 9, 3 pp., 1 map.

The work described was part of a sanitation demonstration programme of the Communicable Disease Center and Texas State Health Department. Its specific purpose was to determine the extent of house-fly movement across the Rio Grande River, between Laredo, Texas, and Nuevo Laredo, Mexico. These two adjacent towns are representative of a number of others on the U.S./Mexican border. They are separated by the Rio Grande and its lowland areas, averaging 300 yards in width. Laredo has a population of 60,000 people in 14 square miles compared with 69,000 in the 5 square miles of Nuevo Laredo. Preliminary surveys of the two towns revealed that Nuevo Laredo had greater abundance of

large animals, there being 355 premises with cows, pigs, goats or horses as compared with less than 115 such premises in Laredo. Preliminary observations showed that fly density was greatest in April or May with grill counts of 24–32, declining to 4–6 by August, on account of summer dryness and high temperatures. The level at the test period was about 4 flies per grill count.

Chemical control was stopped in Laredo for 45 days before the trial; no chemical control was done in Nuevo Laredo. The experiment consisted in the release of captured flies which had been fed on radioactive milk (1 millicurie of P-32 per litre) for a day. Releases were made at a number of points along the river, about 25,000 from each bank. Those released from Laredo were also dusted with red dye; those from Nuevo Laredo with a green dye. Some of these flies were recovered from 24 fly traps in Laredo and 26 in Nuevo Laredo, nearly all being within $1\frac{1}{4}$ miles of the release points. To detect the released flies, the collections were scanned with a Geiger counter. Radioactive specimens were then checked for dye by placing them on absorbent paper and applying a drop of acetone.

The results revealed a much greater movement from Laredo to Nuevo Laredo. Of 23 recaptured flies in Laredo, 4 had crossed the river; whereas of 69 recaptured in Nuevo Laredo, 29 had done so. Throughout the period of the trial, the wind blew rather strongly (9 to 29 m.p.h.) from the southeast; *i.e.*, from Nuevo Laredo towards Laredo. Therefore the flies were not blown across the river, but tended to disperse against the wind.

The authors noted that, within each town, flies congregated in areas of low sanitation and they interpret the greater dispersion towards Nuevo Laredo as a response to the larger number of such fly-attracting areas. [It is not clear whether this attraction was supposed to be operated at a distance of over 300 yards or how else it could work.] *J. R. Busvine*

WINTERINGHAM, F. P. W. & HARRISON, A. **Incorporation of [2–14C] Acetate into Acetylcholine of the Adult Housefly *in vivo* under Conditions of Rest, Activity and Insecticidal Action.** *Biochem. J.* 1961, Feb., v. 78, No. 2, Proc. Biochem. Soc. 22p.

PRICE, G. M. **Some Aspects of Amino Acid Metabolism in the Housefly, *Musca domestica*.** *Biochem. J.* 1961, Feb., v. 78, No. 2. Proc. Biochem. Soc. 21p–22p.

KRUEGER, H. R. & CASIDA, J. E. **Hydrolysis of Certain Organophosphate Insecticides by House Fly Enzymes.** *J. Econom. Entom.* 1961, Apr., v. 54, No. 2, 239–43. [29 refs.]

PLAPP, F. W., Jr., BIGLEY, W. S., DARROW, D. I. & EDDY, G. W. **Studies on Parathion Metabolism in Normal and Parathion-Resistant House Flies.** *J. Econom. Entom.* 1961, Apr., v. 54, No. 2, 389–92.

"The absorption, detoxication, and excretion of parathion and para-oxon were studied in susceptible and parathion-resistant strains of the house fly

(*Musca domestica* L.) by radiometric techniques. No differences in the rate of absorption of the toxicants were noted between susceptible and resistant flies. Both insecticides were rapidly detoxified by the flies *in vivo*, with the metabolism being more rapid in the resistant strain. Differences in the rate of excretion of parathion and/or its metabolites were not great, but para-oxon and/or its metabolites were excreted much more rapidly by flies of the resistant strain."

GEORGHIOU, G. P. & METCALF, R. L. **The Absorption and Metabolism of 3-Isopropylphenyl *N*-Methylcarbamate by Susceptible and Carbamate-Selected Strains of House Flies.** *J. Econom. Entom.* 1961, Apr., v. 54, No. 2, 231–3, 2 figs.

BEESLEY, W. N. **Observations on the Development of *Hypoderma lineatum* de Villiers (Diptera, Oestridae) in the Bovine Host.** *Ann. Trop. Med. & Parasit.* 1961, Apr., v. 55, No. 1, 18–24. [33 refs.]

UNESCO. **Proceedings of the Regional Symposium on Insect Resistance to Insecticides, 11–13 May 1959, Cairo, U.A.R.** pp. xxii + 223, illustrated. [Numerous refs.] 1960. Cairo: Unesco Middle East Science Cooperation Office, U.A.R.

This symposium was held in May 1959, in conjunction with the Egyptian Society of Entomology (to celebrate its 50th anniversary) and the proceedings were published at the end of 1960. There were 46 participants from Arab countries in the Middle Eastern Region and two consultants, Professor A. W. A. BROWN from Canada and Dr. J. R. BUSVINE from the U.K. The two consultants each gave 3 or 4 papers on various aspects of insecticide resistance and 13 other papers on allied entomological topics were given by various participants.

The proceedings have been quite well printed, with illustrations and a record of discussions after the papers. Not many new facts of importance are presented; but the book bears witness to the efforts of UNESCO to stimulate interest in scientific problems related to public health in the Middle Eastern region. *J. R. Busvine*

BUSBEY, Ruth L. **Pesticide Names found in U.S.S.R. Technical Literature.** *J. Econom. Entom.* 1961, Apr., v. 54, No. 2, 254–7.

MISCELLANEOUS PAPERS

BHATIA, S. L. **Some Landmarks in the Growth of Medical Research in India.** *J. Ass. Physicians India.* 1961, Apr., v. 9, No. 4, 263–76.

WOOD, R. K. S. [Edited by.] **Biological Problems arising from the Control of Pests and Diseases.** pp. viii + 120, 4 figs. on pl. [Numerous refs.] 1960. London: The Institute of Biology, 41, Queen's Gate, S.W.7.

Appraisals of the value of scientific progress are made from time to time by journalists and by philosophers of various kinds; but it is rare for those actually involved in specialized research to stand back and consider the wider aspects of their work. This was the purpose of a symposium organized by the Institute of Biology, of which the proceedings have recently appeared in print.

Problems which arise in the course of controlling pests and diseases may be of very different types. One kind is simply a technical difficulty of a new sort which threatens success. Such are *The Problem of Drug Resistant Bacteria* and the *Resistance to Poisons by Strains of Insects* described by Dr. Mary BARBER (pp. 89–97) and Dr. J. R. BUSVINE (pp. 99–106) respectively. A somewhat different problem is posed by possible adverse side effects of control measures; for example, the *Consequences of the Widespread Use of Chemicals on Plants: Effects on Man* (Dr. J. T. MARTIN, pp. 17–26) or the use of *Antibiotics in Animal Feedingstuffs* (Dr. R. BRAUDE, pp. 51–55). Possible ways of avoiding excessive use of chemicals were reviewed in *Ecological Problems in Crop Pest Control* (Dr. A. H. STRICKLAND, pp. 1–15) and *Disease Control by Plant Breeding* (Drs. G. H. BELL and F. G. H. LUPTON, pp. 27–37).

The final and most interesting type of problem, however, was that which arose from the very success of disease control. This was discussed in *Biological Problems arising from the Control of Animal Diseases* by Dr. M. CRAWFORD (pp. 39–49) and *The Problem of the Tsetse Fly* by Mr. W. H. POTTS (pp. 69–73). The veterinary and agricultural aspects, however, seemed comparatively easy to cope with, compared with the human counterpart. *Some Results of Disease Control in Tropical Areas* by Professor T. H. DAVEY (pp. 57–67) and *Social and Economic Consequences of Malaria Control* by Sir Gordon COVELL (pp. 75–79) dealt with the dilemma of the conflicts between preventive medicine and over-population. Considerations of the social and political difficulties to be faced as diseases are gradually conquered lead to more subtle questions as to the nature and quality of human populations which may result. Such thoughts led to *Some Considerations on Mental Health and Genetic Disease* (Dr. Eliot SLATER, pp. 81–88) and *Ethical Selection—the Supplanter of Natural Selection in Mankind*, by G. C. L. BERTRAM (pp. 107–116).

This little book contains some thought-provoking prognostications by experts in these various subjects. *J. R. Busvine*

WRIGHT, W. H. **Tropical Medicine in our Time: Development, Responsibilities and Needs.** *Amer. J. Trop. Med. & Hyg.* 1961, Mar., v. 10, No. 2, 119–27. [23 refs.]

REPORTS AND SURVEYS

EAST AFRICA HIGH COMMISSION. **East African Institute for Medical Research Report, 1959–60.** 36 pp., 5 figs. [Numerous refs.] 1960. Kenya: Govt. Printer. [Sh. 3.]

The main activities at this Institute during the year may be divided conveniently into three groups: (1) biochemical and nutritional, (2) ophthalmological, (3) parasitological.

1. Further work has been done on estimating the lean body mass, total body water (by means of tritium), and total body fat. Balance studies on Africans showed that weight gains could be largely water or largely nitrogen (protein).

Detailed estimations of activities (and rests) of 26 African girls at a domestic science school gave figures for their calorie consumption which worked out at 2,050 per day, a figure which agreed well with those worked out for Scottish housewives and their daughters. The calorie consumption under basal conditions and standing up were estimated directly by means of the Kofranyi Michaelis respirometer, and agreed with results obtained elsewhere. Estimates of the calorie consumption of village women made in a similar (but less detailed) manner gave a figure of 2,200 calories per day.

Various analyses of nitrogen and fatty acid distributions in maternal milk, and the albumin and globulins in the maternal sera were made; also the urinary excretion of iron in children exposed to malaria.

2. Some of the ophthalmological work was biochemical and nutritional also. Such was the use of agar electrophoresis to investigate the proteins of the crystalline lens in man and animals, and dietary experiments in rabbits to study the effect of vitamin A lack on the lens. Field work included studies of Bitot's spots both in Ethiopia and in patients in leprosaria in Tanganyika. These studies confirmed the view that Bitot's spots are not always caused by vitamin deficiency. Surveys were made of the incidence of leprous and non-leprous eye lesions in these leprosaria. The vexed question of ocular manifestations of onchocerciasis was also investigated in a survey of the Bakonjo of Uganda, a tribe which is almost 100% infected. It was concluded that onchocerciasis was the most important cause of blindness through corneal and other anterior segment lesions, and that while there is no definite proof that it causes posterior segment lesions the high incidence of optic atrophy and choroidoretinitis associated makes it highly suggestive that it may do so. Surveys were also made on the causes of blindness in Tanganyika, and the incidence of refractive errors in Asian schoolchildren in Mwanza compared with a similar study in Poona.

3. In parasitological work the main emphasis has been switched from filariasis to schistosomiasis. Lines of investigation have included: (a) distribution of the diseases and of the vector snails with investigation of the conductivity of the water, (b) periodicity of the output of ova, and relation to the intensity of infection, (c) epidemiological studies, (d) field studies of the vectors, (e) observations and experiments on cercariae, (f) circumoval precipitin studies, (g) post-mortem studies (here it is interesting to note that they suggest that the calcified bladder of schistosomiasis is due not to tissue calcification but to millions of calcified ova), (h) vector-parasite relations, (i) cercarial outputs from snails. *A. C. E. Cole*

BOOK REVIEWS

TROWELL, H. C. [O.B.E., M.D., F.R.C.P.]. **Non-Infective Disease in Africa. The Peculiarities of Medical Non-Infective Diseases in the Indigenous Inhabitants of Africa South of the Sahara.** pp. vii + 481, illustrated. 1960. London: Edward Arnold (Publishers) Ltd., 41, Maddox Street, W.1. [70s.]

This outstanding textbook is the product of great erudition and much devoted research. In it, Dr. Trowell not only draws on his remarkable fund of personal experience in East Africa but also furnishes a very complete review of the literature, French and South African as well as English, which bears on every aspect of his subject. Though it is essentially a book to which one would wish to refer for guidance on a specific problem or disease, nevertheless, the writing is so clear, logical and economical that one may read it with delight from cover to cover.

The chapters are sensibly arranged so that related conditions are described in close sequence, and essential references are given at the conclusion of each subsection.

The development of the African child is described and many aspects of the physiology of the African adult are compared with those of the European in a series of well-selected tables. The variation of disease in the African from the same condition as seen in the European receives much attention and is treated in a similar manner.

So much of interest and importance is included in the 471 pages of the text that it is possible only to select a few points for special comment. In an excellent chapter on cirrhosis of the liver, the author points out that in man a sharp distinction between post-necrotic scarring and the more insidious type of septal cirrhosis (Laennec's cirrhosis) often cannot be made. One notes with interest that schistosomiasis is included among the causes of the Laennec type of cirrhosis, whereas a more general opinion would be that this disease, in the absence of superadded malnutrition, leads to a biliary type of cirrhosis in which fibrosis is limited to the portal tracts. Primary hepatic carcinoma, in which the hepatocellular type of neoplasm outnumbers the cholangeocellular type by 8 or 9 to 1, is so common that it constitutes 50·9% of all malignant tumours among African workers in the Rand mines.

The author, while dealing with cardiovascular diseases, shows that rheumatic heart disease is as common in Africans as in Europeans—a fact which is not generally appreciated, that coronary artery disease is extremely rare in the former, although atherosclerosis of larger arteries is common, and that cardiomyopathies may be up to 100 times more common in the African than in the European. The reviewer does not agree with the statement that, when making a diagnosis of cardiovascular beriberi one would hope to find supporting evidence in the form of a concomitant peripheral neuritis: in general, cardiovascular manifestations result from an acute deficiency of thiamine and antecede the development of polyneuritis by many weeks. The occurrence of a syphilitic pulmonary endarteritis, causing Ayerza's syndrome, is stated to have been disproved, though no authority for this opinion is quoted. A rare and interesting vascular disease, apparently confined to the African, is symmetrical gangrene

of the limbs in young adults of either sex, the aetiology of which is quite unknown. Multiple thrombophlebitis appears to be unusually common in young adult Africans.

Renal disease is shown to follow much the same pattern in the African as in the European; chronic pyelonephritis and malignant hypertension are well represented. Much obstructive renal damage results from untreated schistosomiasis and gonorrhoea. The author is, perhaps, unduly cautious in his acceptance of quartan malaria as a cause of the nephrotic type of renal disease [this *Bulletin*, 1960, v. 57, 1015].

Another difference of great interest concerns diseases of the alimentary tract. It is recorded that fibrocystic disease of the pancreas is of the utmost rarity in Africans, coeliac disease is probably equally rare and no case of Crohn's disease has yet been conclusively demonstrated. Nor has idiopathic ulcerative colitis yet been recognized in an indigenous African. The acute abdominal crisis of sickle-cell anaemia presents a not infrequent clinical problem in the African child, while acute volvulus, intussusception and strangulated hernia are far more common in the African adult than in the European.

Among neurological conditions, primary pneumococcal meningitis remains notably common in the African; penicillin therapy is often ineffective and chloramphenicol is to be preferred. Neurosyphilis is not rare though its incidence is probably declining; although the meningovascular forms predominate, general paralysis is also represented. It is doubtful if disseminated sclerosis has ever been seen in an African living south of the Sahara. The occurrence of toxoplasmal encephalitis and choroidoretinitis is not mentioned, though these conditions are certainly to be found in West Africa. In writing of the nutritional neuropathies, the author states that these conditions appear to be rare in children and adolescents and doubts whether malnutrition alone is the causal factor. In this he seems to have passed over the reports from Nigeria of Fitzgerald Moore, written in the 1930s [*ibid.*, 1938, v. 35, 72; 1940, v. 37, 432] which provide the most convincing evidence on both points, for Fitzgerald Moore's patients were practically all schoolchildren or college students, who were subjected to severe deprivation of B group vitamins in residential institutions.

Interesting and significant variations in the endocrine make-up of the African are also described. As a general rule, the suprarenal cortex is proportionately smaller in relation to the medulla than in the European, and stimulation by corticotrophin evokes a lesser output of 17-ketogenic steroids from it. The excretion of oestrogens by the adult male Bantu is also significantly higher than in the European. The Bantu has also been shown to be unduly sensitive to insulin according to European standards. It should be noted that diabetes mellitus is not a complication of Bantu siderosis.

A further fascinating disease peculiar to the African is Bantu porphyria, an entity which, though it bears some resemblance to porphyria cutanea tarda in the European, is not genetically determined but is probably a sequel to the prolonged use of impure, hepato-toxic alcoholic drinks. This condition may be related to Bantu siderosis.

One of the most fascinating chapters in the book deals with anaemias in the African. In its clarity, authority and comprehensiveness it typifies the whole work and is completely up to date except in the omission of reference to drug-induced haemolytic anaemia due to a defect in the intracorpuscular enzyme, glucose 6-phosphate dehydrogenase.

The above remarks are made in order to illustrate the remarkable range and interest of this admirable work, and the minor criticisms which are made should in no way detract from its high value. The reviewer regrets, however, that an avoidably large number of misprints mar the otherwise excellent production.

Dr. Trowell's high reputation will be further enhanced by this outstanding volume, which makes an invaluable advance in the understanding of disease in the African patient. *J. H. Walters*

BOURNE, Geoffrey H. [Edited by] & WILSON, Eileen M. H. [Assistant Editor]. **World Review of Nutrition and Dietetics. Vol. 2.** pp. viii + 247, numerous illustrations. 1960. London: Pitman Medical Publishing Co. Ltd., 39, Parker Street, W.C.2. [60s.]

The second volume of this annual series again provides summaries and critical evaluations of recent work, through authoritative reviews by authors of distinction in their particular fields of study. Again, as in the first volume [this *Bulletin*, 1960, v. 57, 1238], the title of *World Review* is fully justified by the international range of its contributions.

A. ASCHKENASY, of the Centre National de la Recherche Scientifique, Paris, in *Proteins and Haematopoiesis* (pp. 5–23), describes the experimental evidence for ascribing the hypochromic microcytic anaemia, and leucopenia, of protein-depletion, to maturation-block and excessive haemolysis, caused both directly by deprivation of amino-acid constituents of blood cells and serum and indirectly by imbalances of hormones and vitamins.

D. S. MCLAREN, of the East African Institute for Medical Research, writing on *The Effect of Malnutrition on the Eye: with Special Reference to Work with Experimental Animals* (pp. 27–51) notes the tendency for workers in different special subjects in medicine to neglect common ground, where their subjects overlap. There is a widely scattered literature dealing with both clinical and experimental aspects of malnutrition and the eye, and it is surprising that so much more attention has been paid to certain much less devastating results of malnutrition. The article reviews both the human background—the clinical effects of malnutrition on the human eye—and work with experimental animals.

B. ENGFELDT and S.-O. HJERTQUIST of the University of Uppsala, Sweden, in *Vitamin-D Deficiency and Bone and Tooth Structure* (pp. 187–208) observe that while the decline in incidence of clinical rickets in civilized countries has been so considerable that it is now considered extremely rare, sporadic rachitic and osteomalacic lesions are still encountered, and, with poorer nutrition or neglect of prophylaxis, there would be a great risk of the disease regaining considerable clinical significance. This plea for the clinical importance of their subject is, perhaps, over-apologetic; coincident with the decline of rickets in countries where traditionally it was endemic, there has been an increasing awareness of its importance in Asia and Africa, where it is certainly no less preventable than in a temperate climate. With increasing urbanization and social change, its importance may not, perhaps, decrease.

Therese TERROINE, of the Laboratoire de Biochimie de la Nutrition du Centre National de la Recherche Scientifique, Bellevue, France, describes *The Vitamin Interrelations of Ascorbic Acid* (pp. 103–130). This monograph, though of necessity restricted to experimental work with laboratory animals on a subject about which much is yet unknown, must be of particular interest to those

concerned with avitaminoses, or with diets on the borderline of vitamin deficiencies.

Other monographs are:—

Dietary Factors and Adrenocortical Hormone Secretion (pp. 55–65) by Albert B. EISENSTEIN, Director, Division of Medicine, The Jewish Hospital of Saint Louis and Associate Professor of Medicine and Preventive Medicine, Washington University School of Medicine, Saint Louis, Missouri, U.S.A.;

Microbiology of Digestion (pp. 69–99) by D. P. CUTHBERTSON and P. N. HOBSON, Rowett Research Institute, Aberdeen, Scotland;

The Role of Carotene and Vitamin A in Animal Feeding (pp. 133–155) by W. A. MCGILLIVRAY, The Dairy Research Institute (N.Z.), Palmerston North, New Zealand;

Parathyroid Glands and Calcium Metabolism (pp. 159–183) by Alexander D. KENNY, West Virginia University Medical Centre, Morgantown, West Virginia, U.S.A.;

Fluorine (pp. 211–242) by Prof. T. GORDONOFF and Prof. W. MINDER, School of Medicine, Bern University, Switzerland.

These annual volumes of reviews have become essential works of reference for medical and scientific workers engaged in animal or human nutrition. Skilful evaluations of this kind are of value anywhere, but they are of particular value to those working in tropical countries, where access to scientific publications is so often limited. *T. P. Eddy*

BECKMAN, Harry [M.D.] **Pharmacology. The Nature, Action and Use of Drugs.** 2nd Edition. pp. xvii + 805, 105 figs. 1961. Philadelphia. London: W. B. Saunders Co., Ltd., 7, Grape Street, W.C.2. [£5 8s. 6d.]

Harry Beckman is the Chairman of the Departments of Pharmacology at Marquette University, Milwaukee, and edits the *Year Book of Drug Therapy*. He is therefore well qualified to undertake the difficult one-man task of writing an up-to-date textbook of pharmacology for medical students; he has done very well, particularly in the major part of the work which covers pharmacodynamics.

The first 75 pages are a background to the subject and deal with such matters as the sources and development of modern drugs, the assessment of clinical activity and side effects and the legal control of potent substances. The style is that of a familiar and cheerful lecturer to a student; opinions and assessments are given in the first person singular. It is a style which palls a little to the more sophisticated reader, but it has its advantages and enables the author to put across some important points with a force which would be difficult to match in a more conventional style. Thus, in a discussion of the effects of placebos and the assessment of the value of new drugs he writes: "You hasten to give the new drug as soon as its magical powers are announced. The patient demands it, he believes in it, and so too may you at the time. Then the drug is generally acknowledged to have been a mistake, a failure. But you and your patient got results . . . I would say: Do not deny to the gods the thanks due for making man the impressionable animal he is. Unless the doctor is willing to admit that his role as a dispenser of placebos, whether of drug or other nature, is upon occasion an important part of the doctor-patient relationship, he had better quit dealing with people and go into veterinary medicine" (p. 43).

The greater part of the text is devoted to the action and uses of drugs arranged according to their spheres of activity. Sections describe drugs which affect muscle, blood, blood vessels, the central and autonomic nervous systems, the eye, the kidneys, liver, gall-bladder and intestinal tract. There are chapters on enzymes, hormones and vitamins. The chapter on antibiotics is as up to date as could possibly be expected in this rapidly changing field, and covers recent introductions such as griseofulvin, kanamycin and oleandomycin.

Chapters on chemotherapy are on the whole satisfactory, but those which would have particular interest for the practitioner in the tropics are sketchy and clearly fall outside the author's usual territory. Thus, under the treatment of amoebic dysentery we find: "And we must give our attention to the cysts also, for if we could completely destroy them the disease would perish from the earth, and good riddance" (p. 534), and: "In *leishmaniasis* the diamidines are effective agents to fall back on when the antimonials fail; even recalcitrant American cases (Chagas's disease) have yielded" (p. 559).

The antimalarials chloroquine and primaquine are described in detail; the author seems to be under the impression that chloroquine was an American discovery. Emetine, carbarsone, Milibis, halogenated hydroxyquinolines and antibiotics are in the list of amoebicides but there is no reference to the extensive work done outside the U.S.A. on the amoebicidal dichloracetamide derivatives. Melarsen is mentioned as the most active arsenical for the treatment of trypanosomiasis, but there is no reference to melarsoprol (Mel B).

Stilbamidine and hydroxystilbamidine appear for trypanosomiasis and leishmaniasis—pentamidine gets a passing mention. Antimonials for the treatment of leishmaniasis are listed as antimony potassium tartrate, stibamine glucoside (Neostam) and ethylstibamine (Neostibosan); there is no mention of urea stibamine or of sodium stibogluconate which have been the most widely used drugs in this field since the war.

All the anthelmintics are summarily dealt with in 5 pages; piperazine and dithiazanine appear but bephenium and pyrvinium do not.

It is, of course, a losing battle to keep pace with rapid new developments in a textbook of this nature. The only work of parallel magnitude (which this volume somewhat resembles in type and lay-out, but not in style) is GOODMAN and GILMAN'S *The Pharmacological Basis of Therapeutics* (Second Edition, 1955. New York: Macmillan). For the description of drugs used against tropical diseases, the earlier work is, in many ways, more up to date and more reliable than the book under review. *L. G. Goodwin*

GELFAND, Michael [C.B.E., M.D., F.R.C.P.]. **Northern Rhodesia in the Days of the Charter. A Medical and Social Study 1878–1924.** With a Foreword by Col. The Lord ROBINS, K.B.E., D.S.O. pp. xvii + 291, illustrated. 1961. Oxford: Basil Blackwell, 49, Broad Street. [30s.]

The author has produced this handsome volume, well illustrated, from the material available to him in the Central African archives and from information of a personal character from people still living who played a big part in the development of Northern Rhodesia. The volume is dedicated to the grandparents and parents of the author's wife, who settled at the railway siding on the newly constructed railway line at Lusaka when they opened a trading store on the site of the present capital city of the Protectorate.

It is history written from a rather unusual angle; the impact of the medical

experiences and sufferings of the early pioneers on the development of a country of 300,000 square miles which even now has less than 3 million inhabitants.

In separate chapters are described the routes of entry of the early European visitors, generally missionaries after the explorers, hunters and traders, who began to travel into the country from 1870 onwards. The Jesuit Fathers came from the south but they were ravaged with disease, particularly malaria, and suffered heavy casualties, and the attempt was abandoned in 1885. They were followed by Protestant missionaries who established themselves in the Barotse plain and secured the favour of Lewanika. The Paris Evangelical Mission Society was a prominent group and their leader, François Coillard, and his wife are truly founders of Northern Rhodesia. Their early experiences illustrate the sufferings they endured but the author suggests that they survived and prospered where the Jesuits had failed because they were accompanied by their wives and families, and feeding, housing and domestic arrangements were better organized.

The entry of missionaries from the north appears to have been forced on them, seeking a healthier site among the Bemba people on the plateau between Lakes Tanganyika and Nyasa. The London Missionary Society and the White Fathers were particularly successful. By 1893 Dr. Mather had founded the first leprosy settlement in Northern Rhodesia and in general work saw 5,000 patients in a year, of whom 1,300 were new cases, a truly astonishing achievement in those days of superstition and fear.

The establishment of civil administration followed efforts to stamp out slave trading. When slavery was stamped out, the labour recruiter came into his own; labour sought employment on the mines in Southern Rhodesia, and the necessity to control this labour migration and insist on good health standards was an important aspect of Government medical and health work before the First World War. Civilization spread along the railway line as it was laid and it was here that the Government services first became established. The knowledge that there were rich deposits of minerals was known to David Livingstone and early explorers and the discoveries in Katanga and the use of copper by Africans encouraged geological studies. The first producing copper mine was at Kansanshi in 1902 but further development of the Copperbelt was slow because of the disease risks, particularly malaria.

The early development of the organized medical services by the administration is clearly drawn and it is interesting to note how often doctor was also magistrate and administrator. Interesting accounts are given of the early studies on plague and particularly sleeping sickness, and the story of Kinghorn and Warrington Yorke's discovery in 1912 that human trypanosomiasis in the area was transmitted by *Glossina morsitans* is given in a clear and interesting way.

Chapters are devoted to the development of townships and local governments and how health considerations played an important part in the siting or moving of townships; and to education.

The years of the First World War were trying days in Northern Rhodesia and the operations against the Germans to the north required the employment of great numbers of " carriers " whose sufferings from disease were extreme.

The author has, by using the medical and health theme, drawn an interesting account of the occupation, development and civilization of a great country and by so doing has brought into one volume the records of many stories and

anecdotes which might otherwise have been lost. Knowing the heavy preoccupations of the author as an outstanding physician and editor of a flourishing medical journal one cannot but admire his industry in producing this volume and hope that he will be inspired to carry on the medical story of Northern Rhodesia to the present day. *D. M. Blair*

INSTITUTO POLITECNICO NACIONAL. **Libro homenaje al Dr. Eduardo Caballero y Caballero, jubileo 1930–1960.** [*Festschrift* for Dr. Eduardo Caballero y Caballero] 593 pp., numerous illustrations. 1960. Mexico.

This volume pays a tribute to Dr. Eduardo Caballero y Caballero, the distinguished Mexican parasitologist, to commemorate 30 years of scientific activity. The publication contains some 70 papers by 85 contributors. In addition to contributions from the Americas, there are papers by workers in Australia, India, Japan, Egypt, Ghana, South Africa and 6 European countries.

The papers are almost entirely helminthological, and with a few exceptions are not directly of medical or public health interest: but readers of this *Bulletin* will be interested in the following, with some of which they will be already familiar.

B. SILVERMAN and G. VARELA (pp. 36–47) describe studies on toxoplasmosis in relation to mental conditions [this *Bulletin*, 1959, v. 56, 880]. R. ZELEDON (pp. 49–53) discusses the use of biochemical methods in the study of the taxonomy of the Trypanosomidae [*ibid.*, 1961, v. 58, 381]. E. G. VOGELSANG (pp. 63–65) gives a short account of rhinosporidiosis. B. DAWES (pp. 95–111) describes a study of the miracidium of *Fasciola hepatica* and penetration of the sporocyst into *Lymnaea truncatula*. H. F. HSÜ, S. Y. HSÜ and C. T. TSAI (pp. 153–160) report further studies on the prepatent periods of the 4 geographical strains of *Schistosoma japonicum* [*ibid.*, 1961, v. 58, 480]. H. F. NAGATY, M. A. RIFAAT and H. M. KHALIL (pp. 209–214) describe trials with the thioxanthone compound CIBA 17581 [*ibid.*, 1958, v. 55, 1346] in schistosomiasis, used alone or in combination with tartar emetic. It is concluded that "the only result of the combination is that low doses of both drugs can be used rather than if each was used alone". Used alone, the new preparation was badly tolerated in the doses employed and appeared to be ineffective against *Schistosoma haematobium* in the 15 patients treated. L. OLIVER (pp. 215–225) discusses the factors affecting the survival of aestivating pulmonate vectors of schistosomiasis (*Australorbis glabratus*) [*ibid.*, 1956, v. 53, 1444; 1959, v. 56, 64]. In particular, experiments were made in sealing the shell opening and it was found that this could prolong survival and reduce weight loss when the humidity was low. L. R. PENNER (pp. 233–236) describes new equipment for determining cercarial incidence in several species of marine and freshwater gastropods. F. BIAGI and S. MEKBEL (pp. 353–356) describe a new autochthonous case of *Echinococcus granulosus* infection in Mexico. L. B. SOTO (pp. 443–450) describes and illustrates histological studies of the skin in onchocerciasis: microfilariae could not be shown to penetrate the lymphatic vessels. J. ALLEN SCOTT (pp. 501–510) describes details of growth and development of *Litomosoides carinii*, with special reference to the study of immunity [*ibid.*, 1952, v. 49, 789; 1953, v. 50, 743].

The work also contains an academic biography of Dr. Caballero, a list of 178 publications by him, reference to 17 parasites named after him, a list of contributors and an index. *H. J. O'D. Burke-Gaffney*

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